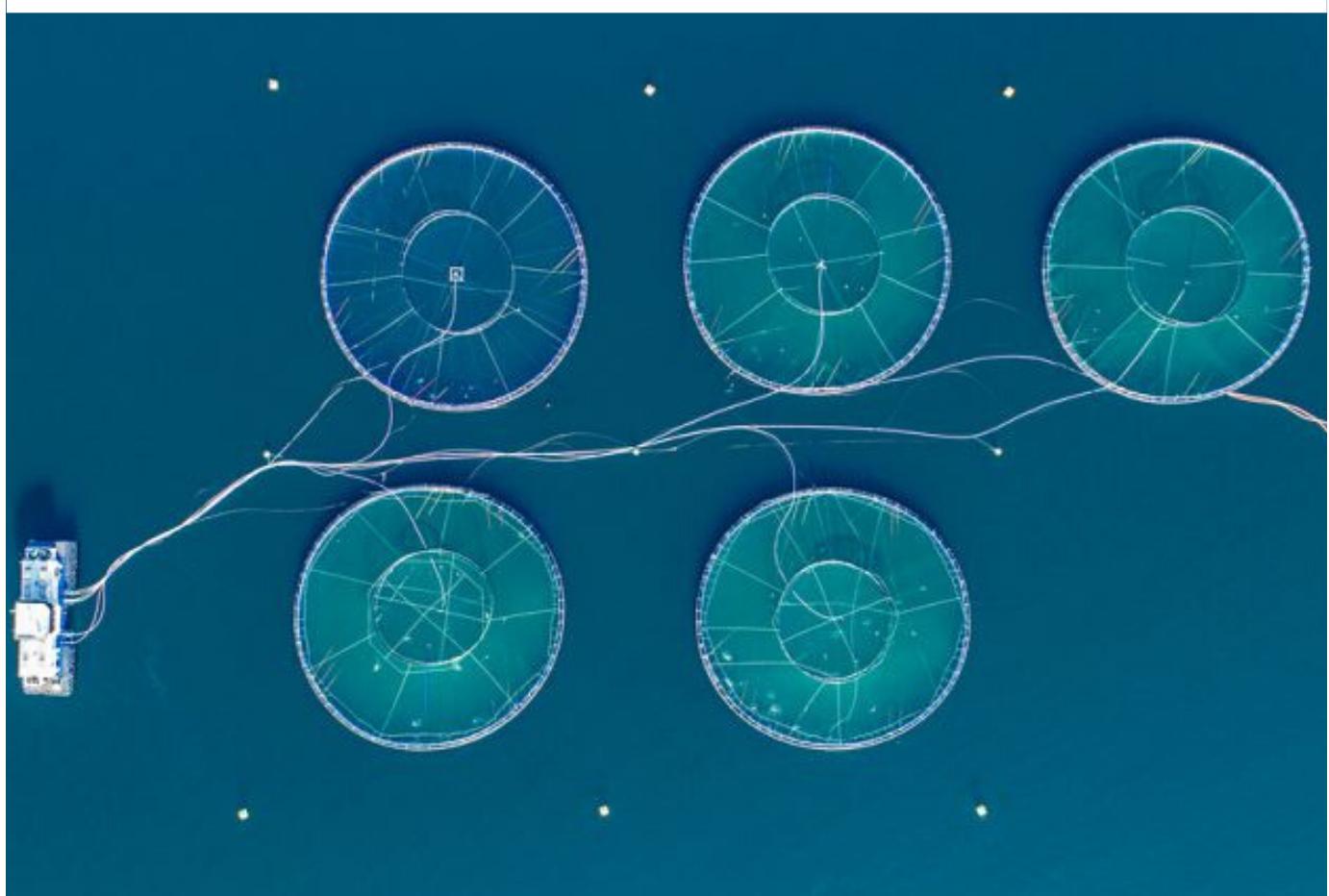


ACTIVITY 1.3

GOOD PRACTICE GUIDE



OCTOBER 2019



European Union
European Regional
Development Fund

TABLE OF CONTENTS

INTRODUCTION-----	2
1. CATEGORIES OF INTERVENTIONS ON RAISING SECTOR'S PERFORMANCE AND ECONOMIC POTENTIAL-----	4
1.1. BUSINESS INNOVATION STRATEGIES -----	5
1.2. TECHNOLOGICAL INNOVATIONS-----	5
1.3. RESEARCH AND DEVELOPMENT-----	6
1.4. STRATEGIC ALLIANCES AND SYNERGIES -----	6
1.5. CAPACITY BUILDING AND AWARENESS-----	7
2. METHODOLOGY OVERVIEW-----	8
2.1. PURPOSE AND RESEARCH DETAILS -----	8
2.2. DATA COLLECTION METHOD-----	8
2.3. GEOGRAPHICAL SCOPE AND CASE COLLECTION TARGETS -----	9
2.4. CASE DOCUMENTATION FORM -----	9
3. IDENTIFICATION OF GOOD PRACTICES -----	11
4. GOOD PRACTICES SELECTED FROM EXTRA-SMES PROJECT PARTNERS-----	15
4.1. ASSOCIATION OF SCOTTISH SHELLFISH GROWERS (ASSG) (UNITED KINGDOM) -----	15
4.2. FRESH VÖLKINGEN GMBH (DEUTSCHLAND)-----	18
4.3. AQUIMER (FRANCE) -----	21
4.4. GOOD PRACTICE CODE FOR AQUACULTURE BREEDING (SALMON) (POLAND) -----	23
4.5. MEDITERRANEAN COASTAL WETLAND DOÑANA MARSHES (SPAIN)-----	26
4.6. FLAG SATU MARE (ROMANIA)-----	30
4.7. SUPERTANKER FARMS HAVFARM (NORWAY) -----	32
4.8. OFFSHORE SITE AQUALAVAGNA (ITALY) -----	35
4.9. KEFALONIA FISHERIES (GREECE) -----	38
4.10. CROMARIS (CROATIA) -----	41
4.11. AQUACULTURE STEWARDSHIP COUNCIL - SEABASS, SEABREAM AND MEAGRE STANDARD (NETHERLANDS) 45	
4.12. BIOMAR (DENMARK)-----	49
4.13. RECIRCULATION FISH FARM FOR FOOD FISH PRODUCTION (FINNFOREL OY) (FINLAND) -----	51
4.14. GOOD PRACTICE CODE FOR AQUACULTURE BREEDING (ITALY)-----	54
4.15. PROJECT "PRODUCTION AND MARKETING PLAN OF THE NATIONAL ASSOCIATION OF AQUACULTURE AND FISH PRODUCT PRODUCERS" (LITHUANIA) -----	58
CONCLUDING REMARKS -----	61
REFERENCES -----	63

INTRODUCTION

The EXTRA-SMEs project aims to improve and adapt aquaculture business development strategies through reflection and analysis, share lessons learned from actual implementation, and implement large-scale, sustained and more effective interventions to raise sector's productivity and competitiveness, based on validated results and evidence. To accomplish this goal, EXTRA-SMEs' participating organisations are summoned to gather practical insights and share good practices on various aspects and dimensions of aquaculture business development strategies.

A good practice is a process or methodology that has proven (through experience or research) to function well within a specific context (geographical or organisation settings), has succeeded in achieving its strategic and operational objectives, and therefore can be recommended as a reference model. It refers to a successful experience, which has been tested and validated in practice and demonstrate high transferability potential. Good practices need to be disseminated and widely adopted to benefit a greater number of people or/and organisations.

The essence of identifying and sharing good practices is to get inspiration and learn from others, who have already faced and successfully overcome similar challenges, and to encourage the application of existing knowledge and experience to new situations. A practice, characterised as "good" should not be regarded as prescriptive or flawless, nor can it apply to all contexts and conditions. Instead, it needs to be adapted to the context to respond to site or organisation specific challenges.

This Good Practice Guide (GPG) presents 15 good practices and cases on business strategies and interventions, which have positively contributed to raising the economic potential and supporting innovation and extraversion of the aquaculture sector across Europe, and hence can be used as reference models in similar endeavours.

The Guide aspires to assist project partners and organisations working on economic potential deriving from aquaculture development in order to increase their efficiency by adopting tools (or components of them) which have proved to work well in similar contexts, capitalising on existing knowledge. Any interested bodies will be able to study how these (successful) practices and tools function and eventually take on those that suit better to the needs and features of their territories – in all cases localisation and adaptation to individual needs is required.

The Guide is structured as follows. Section 1 describes the main categories of strategies and approaches to foster aquaculture development and extraversion in aquaculture SMEs, essentially

raising the perceived economic potential of the sector as a whole in partners' regions and across the EU. Section 2 sketches the methodological framework upon the collection of practices by partners was realised. Section 3 outlines the approach employed for the identification of good practices, including a score table with evaluation results. Section 4 presents in details the most successful cases (as collected by project partners), showcasing the results and accomplishments achieved. Concluding remarks are finally provided summarising the most important elements of the best practices.

1. CATEGORIES OF INTERVENTIONS ON RAISING SECTOR'S PERFORMANCE AND ECONOMIC POTENTIAL

This section presents the main categories of interventions on raising the sector's performance and economic potential, in order to streamline data collection by project partners. The focus will be on strategies and approaches to foster aquaculture development and extraversion in aquaculture SMEs, essentially raising the perceived economic potential of the sector as a whole in partners' regions and across the EU. Collected cases include initiatives from both aquaculture businesses and public authorities.

Data collection activities concern the following categories of business interventions/activities:



1.1. Business innovation strategies

This category focuses on business innovation strategies for aquaculture SMEs across the value chain that improve their competitiveness and productivity. Innovation is a major driver of economic advancement. It plays a crucial role in meeting international challenges, especially in areas such as environmental conservation and sustainability. The current challenges in aquaculture innovation are related, among others, to improving production processes, increasing nutrition value of aquaculture products, developing specific species diets, and health management.

There are several different ways an aquaculture business can achieve innovation, including but not limited to: a) product innovation (new products and services to market and major improvements in the functionality or user characteristics of existing goods and services), b) process innovation (technologies, processes, equipment), c) organizational innovation (workplace organization, commercial practices, relations with wholesalers and retailers), and d) marketing innovation (branding, distribution channels, labelling).

1.2. Technological Innovations

This category has evaluated the adaptation to alternative feed sources, disease resistance, feed efficiency, human health and modern nutritional requirements requires, among others, technological innovations across the aquaculture value chain. For the purposes of this study, this category has mostly revolved around technological innovations in the areas of recirculation, reproduction, disease management and feeding.

Recirculation aquaculture is fundamentally a life support system for fish. It is commonly defined as intensive aquaculture in which the water is reconditioned as it circulates through the system, and no more than 10% of the total water volume of the system is replaced daily. In order to compete economically and efficiently use the substantial capital investment in the recirculation system, the fish farmer needs to grow as much fish as possible in his system. **Reproduction innovations** focuses on biotechnology which can be applied to the reproduction stage, in order to increase aquaculture production and foster ecological sustainability. **Disease management** concerns the production of specific pathogen free and specific pathogen resistance stocks, which are two complementary objectives being developed through shrimp broodstock management programmes. Finally **feed technologies** imply that intensive aquaculture relies heavily on commercially produced fish feeds, which can lead to increased water usage and pollution.

1.3. Research and Development

Productivity and competitiveness are strongly linked with investments in knowledge creation and, consequently, in research and development. This category comprises cases of R&D investments or projects launched in partnership countries by private actors, to support innovation adoption and advance the sector. R&D areas for sustainable aquaculture development and modernisation include:

- Improving management procedures that reduces handling of fish altogether
- Improved fish grading techniques
- An early warning system for fish disease outbreaks
- Efficient and possibly alternative methods of treating fish when they are subject to disease outbreaks
- Aquatic animal health (pathogen identification, detection and screening)
- Certification tested
- Hatchery operations
- Selective breeding

1.4. Strategic alliances and synergies

It is observed that building partnerships with research institutes, civil society organizations, academia, international development organizations and the private sector (businesses across the aquaculture value chain), can help unleashing the innovation potential of sector, and increase performance and competitiveness of individual aquaculture businesses. Cooperation can furthermore optimize resources (both financial and human) and intensify research capacities, provide a place to share experiences, information, facilities and equipment, and finally exploit the different and specific competencies of the parties involved. Indicative examples that fall into this category are:

- Cooperatives
- Innovation and knowledge networks
- Clusters
- Public Private Partnerships

1.5. Capacity building and awareness

The development of fully functioning knowledge networks through capacity building and awareness raising activities can have significant impacts on innovation efficiency and effectiveness, in reducing the transaction costs of knowledge diffusion and by encouraging green innovation in areas where market signals are not fully effective. Furthermore, capacity building is a cross cutting theme, considered to be a key driver for sustainable aquaculture development and innovation adoption.

Finally, there is wide consensus on the importance of aquaculture both as a traditional food production and supply sector that can address the world's growing demand for seafood, and as a key driver for sustainable Blue Growth with multiple benefits for coastal communities and significant contribution to environmental protection. On the other hand, even in leading producing areas, there is a distinct lack of general awareness on the importance and large economic potential of the sector.

2. METHODOLOGY OVERVIEW

2.1. Purpose and research details

The purpose of this research activity was to collect good practices on raising the economic potential and supporting innovation and extraversion of the aquaculture sector that will assist public authorities in identifying ways to create an encouraging environment for aquaculture SMEs, boosting sectoral growth and fostering internationalization. The rationale behind the documentation of good practices is to share lessons learned, gather practical insights on how to improve and adapt strategies and activities through reflection and analysis, and implement large-scale, sustained and more effective interventions based on validated results and evidence.

The scope and details of this investigation are briefly described as follows:

- **Thematic area:** Economic potential from aquaculture development
- **Contributors:** Participating organisations in the EXTRA-SMEs project consortium
- **Data collection method:** Desk Research
- **Data collection tool:** Case documentation form
- **Geographical scope:** EU28 with a particular focus on the countries represented in the project consortium (Greece, Italy, Spain, France, Romania, Portugal and Latvia).

Data collection lasted for 3 months, from 15 June to 15 September 2019, in order to secure the sufficient collection of cases/practices from across the EU area. The Distretto Ligure delle Tecnologie Marine (DLTM) was the organisation in charge of coordinating data collection, informing about delays or shortcomings, and encouraging partners to collect as many cases as possible.

2.2. Data collection method

Good practices and cases on business strategies and interventions were collected with the contribution of all EXTRA-SMEs project partners through desk research. In contrast to quantitative analysis, qualitative analysis does not begin when all the data are collected, but rather is an on-going process. The reason why research (secondary research) has been selected as methodology of this study is that it represents an efficient way to capitalize on existing knowledge without investing too much time and resources. Desk research also bears the advantage of providing perspectives based on extensive and already validated evidence and data, which partners can filter and use only the parts the current research is targeting.

2.3. Geographical scope and case collection targets

All partners have contributed to data collection with cases exclusively from their country. In addition, the University of Patras has collected cases in a scale from Europe 28.

The methodology suggested two scenarios, regarding the number of cases be collected by project partners: a baseline and a good scenario. In the baseline scenario, the desirable number is 30 cases of aquaculture good practices and tools; the good scenario foresees 45 cases. 38 cases, have been collected reaching that way the good scenario, while the Good Practice Guide includes 15 best practices.

2.4. Case documentation form

This methodology proposed a structured documentation form, to ensure a comparable presentation of collected practices. The form was common for all project partners to facilitate the documentation of relevant evidence and information and guaranteed that all identified practices would be reported in a consistent and clearly structured manner. Project partners have compiled their research findings and filled in the form in English, as appropriate. The case documentation form was made up of 4 core sections and one section related to further information and sources:

Practice identification: This section should provide the context of the practice, addressing the following issues:

- Category of intervention
- Geographical scale
- Location
- Start year of operation

Practice description: This section should address the following questions:

- What is the intervention about?
- What are the main objectives?
- What kind of support did public authorities provide for the implementation of this initiative?

Implementation of the practice: This section should address the following questions:

- What are the main functions of the practice?

- Who initiated the intervention? Who are the key factors involved and support its operation?
- What were the financial requirements? How was the practice funded?

Results and transferability potential: This section should address the following questions:

- What are the main benefits sought by aquaculture SMEs from this intervention?
- What are the key features that make the practice transferable?

Further information: Partners should provide a list of references, links, and source documents to retrieve more information on the practice.

3. IDENTIFICATION OF GOOD PRACTICES

The methodology defined a set of minimum quality requirements and evaluation criteria to guide the assessment of cases delivered by project partners on a “good practice” basis. Overall, “Good” can be defined a practice or tool that has proven to work well within a specific context has succeeded in achieving its strategic and operational objectives. A good practice should have brought positive results on contributing to the sustainable development and internationalisation of the aquaculture sector and demonstrate a sustainable and transferable approach.

The identification of good practices was a two stage process. The first stage involved an initial screening to identify whether the collected cases meet the minimum quality requirements prescribed in the methodology and whether the accompanied data and information is complete and accurate. From the 38 cases gathered by project partners, only 15 satisfied the following minimum specifications.

The cases that have successfully passed the quality assurance and control process, were assessed on the basis of the good practice (evaluation) criteria with the aim to identify the 15 most successful ones. Tables 1 and 2 present the evaluation criteria, together with the classification of practices based on the score obtained. The cases that stood out as “good” and had the higher score, have been selected to be presented in the Good Practice Guide. Table 3 presents the scoring grid that has led to the identification of the 15 most successful aquaculture practices.

Table 1: Evaluation criteria

Criteria	Description
Relevance	This criterion measures the extent to which the identified case is suited to the priorities and policies focused on the sustainable development and internationalisation of the aquaculture sector. This criterion used to determine confidence or strength of inference that the information can address study objectives. Sometimes referred to as ‘weight of evidence’.
Impact	This criterion identifies the benefits delivered and defines the extent to which the practice or tool has positively contributed to raising the performance and economic potential of the aquaculture sector. The practice should have achieved results that are measurable and well documented.

Problems encountered	This criterion evaluates the dimension of main socio economic and political problems and difficulties that have blocked the successful adoption or/and execution of intervention in the sector. Critical aspects affecting implementation of the stakeholder approach can be: the institutional capacity of stakeholder organizations; legitimacy of the organizations and process, costs of stakeholder involvement, degree of stakeholder competition, and levels at which stakeholders are involved.
Public support	This criterion evaluates the kind of support (e.g. funding, technical support, consultancy services, access to information) provided by public authorities to support the implementation of the intervention identified.
Transferability	This criterion evaluates whether the practice demonstrate strong evidence that it can be also effective for other taxonomic groups, aquaculture realms, and EU regions. To evaluate transferability potential, it is useful to consider the following questions: Are the needs addressed common across aquaculture realms and regions?

Table 2: Classification of practices

Classification	Description	Score
Poor	A poor practice entails constraints during implementation and poor results. Its relevance, effectiveness and potential for transferability for other taxonomic groups, environmental sustainable sectors and regions cannot be proven.	5-9
Promising	A practice that has worked for a taxonomic group and has produced some tangible, measurable results. A promising practice should be transferred in other regions.	10-13
Good	A practice or tool that has proven to work well within a specific context has succeeded in achieving its strategic and operational objectives. A good practice should have brought positive results on contributing to the sustainable development and internationalisation of the aquaculture sector and demonstrate a sustainable and transferable approach.	14-20

Table 3: Overview of the selected practices

#	Country	Title	Relevance	Impact	Problems encountered	Public support	Transferability	Total score	Classification
1	United Kingdom	Association of Scottish Shellfish Growers (ASSG)	4	4	4	4	4	20	Good
2	Deutschland	FRESH Völklingen GmbH	4	4	4	4	4	20	Good
3	France	AQUIMER	4	4	4	4	4	20	Good
4	Poland	Good practice code for aquaculture breeding (salmon)	4	4	4	4	4	20	Good
5	Spain	Mediterranean coastal wetland doñana marshes	4	4	4	3	4	19	Good
6	Romania	FLAG Satu Mare	4	4	3	4	4	19	Good
7	Norway	SUPERTANKER FARMS HAVFARM	4	4	4	3	4	19	Good
8	Italy	Offshore site AQUALAVAGNA	4	4	2	4	4	18	Good
9	Greece	Kefalonia Fisheries	4	4	4	2	4	18	Good

#	Country	Title	Relevance	Impact	Problems encountered	Public support	Transferability	Total score	Classification
10	Croatia	Cromaris	4	4	4	2	4	18	Good
11	Netherlands	Aquaculture Stewardship Council - Seabass, Seabream and Meagre Standard	4	4	3	2	4	17	Good
12	Denmark	BioMar	4	3	4	2	4	17	Good
13	Finland	Recirculation Fish Farm for food fish production (Finnforel Oy)	4	3	2	4	3	16	Good
14	Italy	Good practice code for aquaculture breeding	4	3	2	3	4	16	Good
15	Lithuania	Project "Production and marketing plan of the national association of aquaculture and fish product producers"	4	3	2	3	4	16	Good

4. GOOD PRACTICES SELECTED FROM EXTRA-SMEs PROJECT PARTNERS

4.1. Association of Scottish Shellfish Growers (ASSG) (United Kingdom)



Practice description

The Association of Scottish Shellfish Growers (ASSG), is operating in Scotland since 1986 and constitutes a strategic alliance between shellfish growers, in order to promote capacity building and awareness for their products and aquaculture responsibility with a regional scope. The practice under examination is the ***Code of Practice of 2005***.

There are numerous codes of good practice relating to shellfish, currently or potentially available to shellfish growers, ranging from national Codex Alimentarius recommendations about best hygiene practice, to environmentally focused proposals for protection of the natural heritage.

The **ASSG Code of Good Practice** applies to regulatory and research outcomes as well as developments in husbandry techniques and advice about optimal management of predators. Finally, the Code is available in hard copy and electronic version, with all updates to be supplied as appropriate and as required.

Mission / Objectives

The ASSG Code of Good Practice is targeted at the overall activities of shellfish growers, including the essential requirement of making a profit margin in order to continue to operate. The ASSG estimates that by following the practices, the grower would be able to produce a superior quality product, while maintaining high standards for shellfish health and satisfying hygiene regulations. As a result customer health is safeguarded while also the impact of the operation on the natural environment is significantly minimized.

The importance of this shellfish industry Code of Good Practice document is essentially to ensure that activities are managed in an environmentally responsible and sustainable manner



that is in harmony with the needs of other marine and shoreline users. The Code is designed to serve as an important reference for shellfish growers, to inform on existing guidelines and to address issues of concern. Finally, the ASSG Code addresses concerns of consumers, environmental organizations, government and the general public.

The implementation of the ASSG Code has been considerably endorsed by both regional and local public authorities. On the one hand direct funding occurred via EU funded programs such as Leader, while on the other the practice has been supported through funding by organisations such as the Crown Estate, the Highlands' Council, the Highlands & Islands Enterprise, and the Scottish Natural Heritage Division.

Functions

The Code of Practice provides general rules and guidelines (based on the existing relevant legislation) for all the activities of the shellfish aquaculture including the following: establishing a shellfish farm; locational planning; site or equipment modification; site access; navigational safety; visual impact (landscaping); noise and light, odour, marine birds and other wildlife; carrying capacity; introduction of new species and disease; husbandry and harvesting; monitoring for microbiology; biotoxins and other contaminants; use of vessels, vehicles and marine equipment; use and storage of chemicals, fuels and lubricants, construction and equipment standards, waste management, biofouling, training, health and safety regulations and policies; depuration).

Impacts / Results

The adoption and implementation of the Scottish Code of Practice has progressively led to considerable results, signifying the positive impact of this strategic alliance. The code has raised public awareness on sustainably aquaculture as it endorses fully sustainable growing practices. In addition this assembly of many local growers has improved their capacity in total to address more effectively occurring issues related to aquaculture, while also to strengthen their contribution to the environmental protection. Furthermore, the scheme under examination has highly developed cooperation between public and private sector, especially through the usually demanding procedure of fundraising. The impacts on the market have also been positive as the Code has helped Scottish growers to expand their scope and gain access to new markets, increasing that way their productivity and revenues and approaching higher levels in aquaculture innovation.

Transferability

Building upon the positive impacts presented above, the ASSG Code of Practice may lead to significant transferability potential. Common aspects of the needs addressed by that practice can be observed across the EU and therefore the exchange of knowledge, experiences and processes can be proved beneficial to other entities in either local, national or regional level. Furthermore, the audience could extend to all shellfish cultivation activities in Scottish waters and in the longer term, it is expected that the Code will enter the wider international community of shellfish cultivation.

Further information (links, sources of information)

- <http://assg.org.uk>
- <http://assg.org.uk/code-of-practice/4536619829>

4.2. FRESH Völklingen GmbH (Deutschland)

Practice description



FRESH is the world's first major urban seawater fish farm without access to the ocean. Consequently the newly established (2015) German fish farm is an undoubtable example of a business model innovation. The fish produced at FRESH are gilthead, seabass, and sashimi-grade Hiramasa Yellowtail Kingfish.

FRESH the world's only producer of GLOBAL G.A.P. certified Hiramasa Yellowtail Kingfish. Short transport routes guarantee catch-of-the-day quality, reduce the environmental footprint, and significantly improve shelf life. This degree of freshness, combined with ecological sustainability and seamless traceability throughout the entire value chain, including every phase of the animal life cycle, feed, and product chain all the way to the finished product, is unique. FRESH is the world's only closed-cycle seawater fish farm with both GLOBAL G.A.P., and FRIEND OF THE SEA certificates.

FRESH also follows new innovative paths. The closed water cycle with its biological purification is unique and future-oriented. The FRESH Farm in Völklingen (Germany) represents top European research in the field of fish farming in closed cycle systems, standing also in favor for aquaculture's sustainability via focused capacity building and awareness raising. Each of the four fish pools has a water volume of 1,800m³ and allows for a stress-free breeding of fish in unique freshly-caught quality. The system was awarded as finalist in the German Innovation Award 2014.

Mission / Objectives

FRESH sets a new standard for conscious enjoyment of fish. FRESH sea bream, sea bass and king fish are bred in saltwater pools in a resource-saving way. The water is biologically purified in a closed cycle. The fish are fed with certified organic feed. Therefore, FRESH fish are guaranteed free of antibiotics and undesired environmental influences. Short transport routes ensure sea fish enjoyment in a unique freshly-caught quality. FRESH offers freshly-caught fish, which have been ecologically bred in crystal clear waters. FRESH produces premium sea fish in large saltwater pools without access to the sea in a completely closed water cycle. FRESH uses certified organic, ethoxyquin-free (the feed additive ethoxyquin (E324) is permitted as an antioxidant in Europe and is extensively used for the preservation of fish food for

aquacultures. FRESH fish are much more valuable and taste more natural and aromatic than fish predominantly fed with plant-based feed, for example from caged productions in the sea.

Furthermore as far energy matters are concerned, the closed water cycle is particularly resource-friendly and reduces the need for fresh water to below 1%. The energy used partially comes from our own solar system and by 2017, the energy we use will be 100% from renewable sources. Thanks to the proximity to the consumers, the fish offers true “catch of the day” quality, short transport routes, no flight miles incurred and Traceability of each individual fish. The flesh is very firm in structure, easy to process and free from unwanted environmental influences.

The FISH covers needs for:

- Water economy
- Energy save
- Land using competition
- Reducing the carbon footprint
- Food security
- High quality food



Functions

FRESH breeds sea fish with a unique system of a closed water cycle without damaging the environment. Thanks to low land use, valuable habitats are protected. The closed water cycle is particularly resource-friendly and reduces the need for fresh water to below 1%. The energy used partially comes from our own solar system and by 2017, the energy we use will be 100% from renewable sources. The production standards of FRESH are regularly audited by independent bodies.

FRESH moreover, sets new standards for resource-conscious fish consumption:

Breeding in crystal clear, organically purified water, no environmental toxins, no antibiotics, no growth promoters, feeding with organic, certified food without feed additive ethoxyquin (E 324), with catch date and freshness guarantee, full traceability and short transport times and distances, careful use of resources and the environment, direct and fair business with local partners, Swiss and German production quality standards.

FRESH fish is certified according to Friends of the Sea sustainability criteria (fos.org), while the requirements of the WWF Seafood Group are met respectively.

Impacts / Results

FRESH offers attractive local jobs and relies on fair relationships with all business partners. FRESH is the world's first urban saltwater fish farm. The farm has very little in common with conventional sea fish farming. Because FRESH produces premium sea fish, saving resources in a completely closed water cycle, without access to the sea. The proximity to consumers not only saves transport routes but also guarantees previously unattained freshness. FRESH produces according to the highest quality standards and consistently focuses on naturalness. FRESH places great importance on the expansion into other areas of sustainability and on networking with research institutes. FRESH continuously optimizes the use of resources. FRESH saves energy with innovative energy management. The total power consumption is planned to be 100% from renewable energies by 2017.

Transferability

The FRESH LAB, directly adjacent to the fish farm, is available to students and researchers from the fields of biology, technology or business management within the framework of projects supported by FRESH. A modern conference and training centre on the premises of FRESH encourages the transfer of practical knowledge from research and teaching and is available to all interested parties. FRESH helps protect the ocean with a 90% reduced carbon footprint and by using 100% renewable energy. FRESH has been awarded as the "Best Aquaculture Innovation 2018" and is a member of the Solar Impulse Foundation's "World Alliance for Efficient Solutions" (solarimpulse.com).

Further information (links, sources of information)

- <http://www.freshcorporation.com/en/>

4.3. AQUIMER (France)

Practice description



AQUIMER was founded in 1999 and designated a national Competitiveness Cluster in 2005 by the French government. AQUIMER is an alliance companies, scientists and training centres implementing R&D and business innovation model in order to increase economic potential from aquaculture development. More specifically, the aim of the AQUIMER competitiveness cluster is to reconcile the depletion of seafood resources and the increase in food demand with the imperatives of sustainable development.

Mission / Objectives

The main objectives of AQUIMER are:

- To assemble the needs of businesses in the field of aquatic products or to provide assistance in identifying them, at the national level
- To define research priorities and to call upon the skills of scientists and training centers in order to produce concrete results.
- To provide a supplement in the development of collaborative R&D projects.
- To provide a link with suitable contacts (businesses, scientific organizations, technical and training centers).
- To support technically and administratively in the preparation of projects (funding applications, consortium agreements, communication of results).
- To deliver information, sensitization, and communication: access to shared technological tools and at the Pole's Watch Centre (online database, question/answer service...).

Functions

AQUIMER's programmes focus on three themes:

- Maximising the available resources and creating new resources based on sustainable development.
- Positioning fishery products in future foodstuffs.
- Changing the fundamentals of the aquatic food industry to promote the emergence of new technological and business approaches.

Its goal is to increase the competitiveness of companies while at the same time meeting their requirements, helping them develop and sustain their activities through R&D and technological improvements. Its role, finally, is to provide an active interface between companies' projects and their implementation.

Impacts / Results

AQUIMER operates within a wide and intricate network of public and private business fostering the adoption of innovative practices and contributing to the resolution of crucial environmental and socioeconomic interests in the national level. It has assisted companies that are involved in the sector of aquaculture to grow, through funding and training projects. Therefore, AQUIMER has increased SMEs' productivity, while the latter have also been benefited directly from AQUIMER through funding and training.

Transferability

AQUIMER is mainly funded by the French government and by the European Union through numerous projects. Its financial partners are the European Union, «préfet de la région nord pas de Calais» (<http://www.prefectures-regions.gouv.fr/hauts-de-france>), «l'europe s'engage en hauts de France» (<https://europe-en-hautsdefrance.eu/>), «communauté d'agglomération du boulonnais» (<http://www.agglo-boulonnais.fr>). Considering the aforementioned, it can be stated that AQUIMER best practices could be transferred to other similar initiatives across Europe, contributing considerably to the aquaculture sustainability development.

Further information (links, sources of information)

- <http://www.poleaquimer.com/en/aquimer/aquimer-en.html>
- <http://www.poleaquimer.com/en/network/financial-partners.html>
- <http://www.poleaquimer.com/en/international/partnership.html>

4.4. Good practice code for aquaculture breeding (salmon) (Poland)

Practice description



Jurassic Salmon Sp. z o.o. was established on May 2013. The company's profile in the framework of technological innovation, is farming of Atlantic salmon in recirculating aquaculture systems, placed in modern facility with an area of 0.9 hectares. Fish farming in closed systems fully corresponds to the ideas of sustainable development and responsible production, allows to minimize the negative impact on the environment and assures the optimum condition and welfare of the fish.

It is a specific response to the constantly growing demand for fish and related products, along with process of shrinking natural resources of fish in the seas and oceans.

Jurassic Salmon facility is the most modern and technologically advanced RAS Atlantic salmon (*Salmo salar*) farm situated in Janowo, West Pomerania, Poland. It is also the world's first plant is using geothermal saline waters for this purpose and the third such farm leading production from egg to harvest size.



This is also the largest farm of such a type in Europe, and therefore this case could constitute best practice not only for Poland but regionally within the EU.

Mission / Objectives

The main objective of the Jurassic Salmon facilities is to ensure the highest quality of organic fish in state of the art farming facilities that guarantee for the clarity of water and the spacious infrastructures.

Jurassic Salmon is highly dedicated to the sustainability of aquaculture. Fish farming that does not contain toxins and heavy metals or other contaminants and ensuring for the exclusion of water pollution, in which fish are bred, are also found in the main priorities of the company.

Furthermore, breeding healthy fish and protecting salmon populations are crucial for Jurassic Salmon and therefore the method of exploitation is in line with biodiversity conservation policies and fisheries welfare.

There is direct funding of the innovation development by company Jurassic Salmon Spółka z o.o. The company used EU funding (operational program "Fisheries and Sea" under Priority 2 - supporting aquaculture as well as subsidies and rebates.

Functions

This aquaculture intervention is carried out through close cooperation between Jurassic Salmon Sp. z o.o., West Pomeranian University of Szczecin (scientific support) and the EU (European Maritime and Fisheries Fund). The aforementioned cooperation has proved itself valuable to achieving a high standards facility which has implemented the following functions:

- Investing the company and EU funds in building a modern salmon farm.
- The first fish breeding and the next (positive results).
- Good Practice documentation.
- Dissemination of the good practice to the fish farmers and the rest of stakeholders.

The operation was co-financed by the European Union - share of EU funds: PLN 1 752 834.24, including funds from the Maritime and Fisheries Fund: PLN 1 314 625.68, including domestic funds PLN 438 208.56 (Operational Program "Fisheries and Sea" under Priority 2). Further funding was also received from EU funds (the share of EU funds: PLN 663 424.70, including the Maritime and Fisheries Fund: PLN 497 568.52, including domestic funds: PLN 165,856.18).

Impacts / Results

The introduction of innovative practices in salmon farming helps to grow healthy and naturally growing fish. This project shows that it is possible to have organic fish farming strengthening and promoting the sustainability in aquaculture development but in parallel have profit. This significantly enhanced the farmed livestock capital and highly increased the productivity and the harvesting crops with a minimal investment, creating an opening for the company to new markets in Poland and beyond.

Furthermore Jurassic Salmon, thanks to the implementation of innovative technologies has stepped in the spotlight raising public awareness and improving capacity for other companies as well to address aquaculture related issues and contribute to the resolution of environmental and socioeconomic issues usually associated with fish farming procedures and infrastructures.

Transferability

Jurassic Salmon facility has implemented innovative technologies for the use of salmon farming, which are easy to implement by other companies in other European countries. The use of innovation brings many financial benefits and causes that fish of much better quality is grown, which are then more often bought by customers.

Further information (links, sources of information)

- <http://jurassicsalmon.pl/>

4.5. Mediterranean coastal wetland doñana marshes (Spain)

Practice description

This intervention is a strategic alliance for the Doñana lagoon, a vast protected coastal marshland in Andalucia, Spain, examined as a best practice from the implementation of Code of Good Practice, which provides a set of guidelines for environmentally friendly aquaculture oriented to extensive or integrated multi-trophic land-based aquaculture production. The scope of the practice is macro-regional, focusing on both Mediterranean and Baltic countries' aquaculture development. Eco-friendly aquaculture may become a valuable tool for ecological restoration and future wetland management, since carefully managed fish ponds are true multifunctional fish farms where various services are provided for maintenance of biodiversity, generation of market goods, recreation and rural tourism.



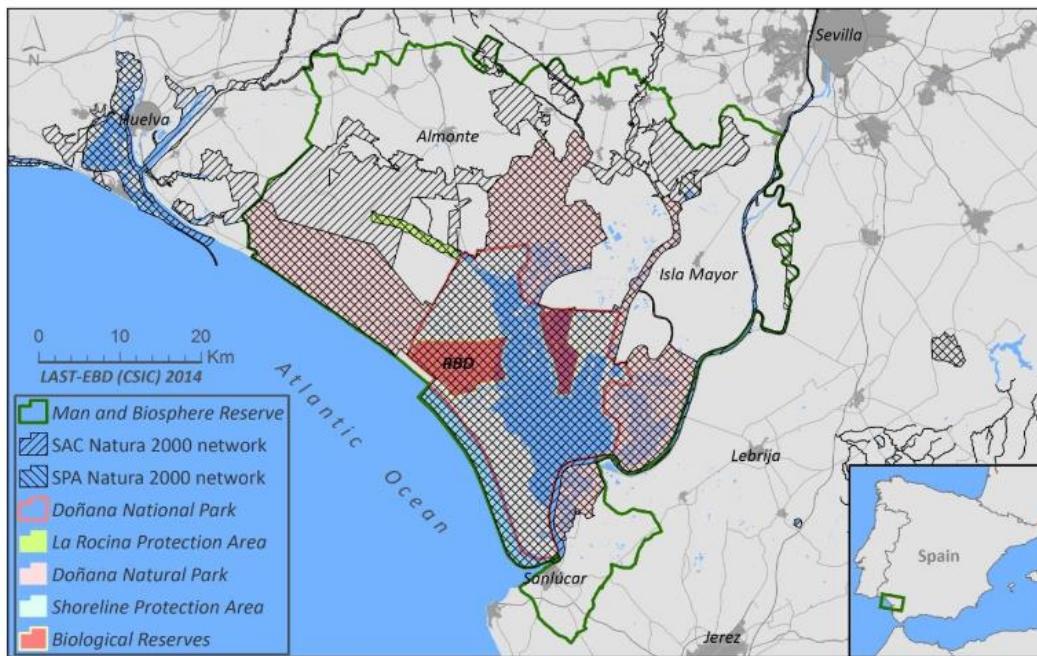
Fastidiously managed aquaculture may enable an increase in biodiversity of a particular area or ecosystem. It is therefore important that the aquaculture sector is provided with clear, easy-to-use and scientifically based guidelines to ensure its sustainable development. This is a declared objective of this particular Guidelines Document. Present guidelines have been sketched by the Regional Activity Centre for Specially Protected Areas (RAC/SPA) of the UNEP Mediterranean Action Plan, in the context of the UNEP-MAP Strategic Action Programme for the Conservation of Biological Diversity (SAP-BIO) in the Mediterranean Region, and following the principles accounted by the Ramsar Convention, the 1978 (revised in 1995) Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (and its Protocols), the 2003 Food and Agriculture Organization (FAO) Code of Conduct of Responsible Fisheries in the Mediterranean⁴, and Union (IUCN) and the Federation of European Aquaculture Producers (FEAP) to cooperate in the development of sustainable aquaculture.

Mission / Objectives

This code is devoted to the interaction between aquaculture practices and the environment, particularly the conservation of threatened species and sensitive wetland habitats, and does not address other aspects of aquaculture activity such as the administrative and legal framework, economic aspects or the role of governance and private organizations on aquaculture planning.

The main objective of the case was to combine sustainable aquaculture practices and environmental conservation, developed during recent years in Doñana coastal marshland. Public authorities have actively encouraged the implementation of this initiative via business support services and more specifically through the participation of the stakeholders in workshops, training activities and meetings.

Figure 1: Protected area limits of Doñana Natural Space at national, European and International Scales (Figure by LAST-EBD/CSIC 2014).



Functions

Good aquaculture practices, in the context of this guide, can be defined as considerations, procedures and protocols designed to foster efficient and responsible aquaculture production and to help ensure final product quality, while protecting and improving the environment.

These aquaculture methodologies have been named as aqua-environmental measures by the Directorate-General for Fisheries and Maritime Affairs, European Commission, and figures in the European Fisheries Fund (EFF).

Beneficial effects of aquaculture on wild flora and fauna can be produced as a result of different factors that are discussed separately in this guide:

- Production system design
- Feeding practices
- Cleaning and sanitation basics
- Facility biosecurity (escapes)

The case of Doñana lagoon was adopted by the Regional Activity Centre for Specially Protected Areas (RAC/SPA) of the UNEP Mediterranean Action Plan, in the context of the UNEP-MAP Strategic Action Programme for the Conservation of Biological Diversity (SAP-BIO) in the Mediterranean Region. The initial intervention was an initiative of a private company under approval by local Fishing Administrators, according to the Plan for the Use and Management of Doñana National Park (PRUG) regulations.

Impacts / Results

Doñana area is taking an innovative approach to sustainable aquaculture that may be effectively exported to other sites through a process of participatory dialogue from local to regional stakeholders. This approach works closely with the natural ecosystem to avoid the pitfalls of conventional, intensive fish farming. The Code summarizes the most relevant aspects of the operational management of sustainable aquaculture under these principles, and may become a useful tool for future plans to regenerate the disrupted marshland areas and coastal wetlands of Mediterranean shores, where the careful use of natural resources such as water and land can generate substantial economic profits while enhancing a wide range of environmental values.

The guide promotes the application of a multidisciplinary and participatory ecosystem approach to integrate aquaculture management and nature conservation. Under this outlook, site selection and management of sustainable aquaculture operations should take into consideration the relationships between the activity and its impacts on surrounding wild flora, fauna and habitat, so as to provide information on the state of the ecosystem.

Furthermore, the investment has been made by a private company (Pesquerías Isla Mayor, S.A. (PIMSA)) under approval by local Fishing Administrators, according to the Plan for the Use and Management of Doñana National Park (PRUG) regulations; 3200 ha of the estate were flooded with first-rate water from the Guadalquivir river delta. The result was a carefully managed wetland supporting a rich and nourished flora and fauna, particularly dense communities of invertebrate species, which are the basis for a vast range of extensive aquaculture products.

Transferability

The code of good practice provides a set of guidelines for environmentally friendly aquaculture oriented to extensive or integrated multi-trophic land-based aquaculture production. Eco-friendly aquaculture may become a valuable tool for ecological restoration and future wetland management, since carefully managed fish ponds are true multifunctional fish farms where various services are provided for maintenance of biodiversity, generation of market goods, recreation and rural tourism.

Principles released from these considerations can be fully implemented all along the Mediterranean coastal region, particularly in those areas where ecosystem functionality has been lost due to land misuse and ecological restoration must be prioritized.

Further information (links, sources of information)

- [UNEP-MAP RAC/SPA, 2012. Best practice guidelines for aquaculture and sustainable management in a Mediterranean coastal wetland: case study of Doñana marshes \(Andalucia, Spain\). By Medialdea, M. Ed. RAC/SPA, Tunis. 30 pp](#)
- [FAO. 2015](#)

4.6. FLAG Satu Mare (Romania)

Practice description



The sustainable development of the fisheries and aquaculture sector within FLAG Satu Mare area through a local development strategy in Fisheries. The intervention examines how the local development strategy in fisheries implemented by FLAG Satu Mare (FLAG = Local Action Group in Fisheries) helps the sustainable development of the fisheries and aquaculture in the abovementioned area.



Mission / Objectives

The main objectives of FLAG Satu Mare are the following:

- Sustainable development of the fisheries and aquaculture area within FLAG Satu Mare territory;
- Fostering economic growth through long-term investments;
- Enhancing the competitiveness of the area through investment and development projects in sectors complementary to fisheries and aquaculture;
- Diversification of economic activities for the benefit of the fisheries sector;
- Preserving and protecting the environment, promoting the area, promoting the natural and cultural heritage;
- Improving the quality of life of the inhabitants.

During the implementation of the initiative several need to be addressed have been identified:

- Unlocking the high and unexploited potential of aquaculture and (recreational) fishing (there are important surfaces of water-bodies summing up a number of 900 ha);
- Exploiting the valuable potential of development of aquaculture related activities, including fisheries related tourism;
- Reducing unemployment in fisheries and aquaculture sector by creating new jobs.

Functions

The main function of the FLAG Satu Mare initiative is to examine how its implementation leads to the sustainable development of fisheries and aquaculture area located within the territory of the FLAG.

The project was funded through the Operational Programme for Fisheries and Maritime Affairs, and has received active support by public authorities especially through business support services such as training and provision of consulting services. In particular, a number of 8 public authorities are members in the General Assembly of the FLAG Satu Mare. Their role is to enhance the implementation of the development strategy through meetings, training sessions, and activities of enlivening the territory. The implementation of the practice was overall successful, hence some problems have been encountered and their roots rest on the lack of expertise and the lack of skills of the employees.

Impacts / Results

FLAG Satu Mare has raised the level of cooperation between public and private sector as it constitutes a partnership between fisheries actors and local private and public stakeholders. Together they designed and implemented a local development strategy in fisheries to address the areas' needs – be they economic, social and environmental. Moreover, Satu Mare has increased productivity as one of the expected results is raising the number of private companies active in the fisheries and aquaculture sector.

Transferability

Fisheries areas across the EU are facing similar challenges. CLLD is a tool that enables local fisheries communities to address these challenges. At European level exists the FARNET Support Unit and by accessing their link <https://webgate.ec.europa.eu/fpfis/cms/farnet2/> further data can also be found on other FLAGs across Europe.

Further information (links, sources of information)

- <https://www.flagsatumare.ro>

4.7. Supertanker farms havfarm (Norway)

Practice description



Aquaculture Company Nordlaks has developed Havfarm in conjunction with NSK Ship Design, a giant ship-shaped fish innovative farm that could revolutionise salmon fishing in Norway resulting to numerous advantages. Havfarm will be an important tool for Nordlaks to reduce its impact on the environment, especially considering interactions of wild fish and their biological footprint. This is going to lead to sustainable aquaculture.

Mission / Objectives

Nordlaks, through Havfarm project invest heavily in increasing the capacity for producing larger smolt (stocking fish) and new sustainable well boat technology, aiming to reducing the environmental impact of aquaculture. Furthermore, Havfarm is very important as it makes it



possible to move the Norwegian aquaculture from the Fjords to the Atlantic Ocean. The 431 meter long farm is one of the most ambitious aquaculture development projects in Norway and will be deployed in more exposed waters than are typical for fish farms.

The Havfarm project started in order to deal with the increase of the demand of fish. So, constructing this ship-like farming facility they increase the number of fish that they produce, without filling up with facilities in areas that are currently already used for aquaculture in Norway, especially in Fjords. Also, because of the fact that aquaculture is very important for

Norwegian economy, Havfarm is supposed to provide an environment-friendly solution. The Havfarm gives the ability to have fishing farms in new areas, where previously without this technology and knowledge was impossible to have aquaculture, giving new potential to the Norwegian aquaculture industry, thus the Norwegian economy.

Functions

In order to expand the aquaculture areas in Norway, Nordlaks initiated the project to create the Havfarm one of the longest ships in the world right now. The Havfarm, designed by NSK Ship Design, would be built at the CIMC Raffles yard in Yantai, Shandong Province, China, with the aim of having it ready for the first stocking of salmon during spring 2020. Havfarm will be permanently moored in a position southwest of Hadseløya in Nordland, Norway, an area that has up until now been impossible to utilise for aquaculture. The main functions of Havfarm are the reduction of its impact on the environment, and the considerable increase of the fish production.

It is worth mentioning that the project was initiated, implemented and financed by private entities. Nordlaks has invested 2 billion NOK (~200 million euros) in the Havfarms for a whole chain of activities from breeding to selling and marketing, while also the design is prepared by a Norwegian ship design company (NSK).

Impacts / Results

The Havfarms practice is estimated to have significantly positive results for the aquaculture development, contributing to the resolution of important environmental and socioeconomic issues and increasing productivity. In particular, some of the impacts of this interventions are the following:

- Expansion of the areas and territories which most appropriately fit for aquaculture. The practice will optimize areas selection while also utilizing areas that previously were impossible to use for aquaculture purposes.
- Increase of the fish production. Havfarm will be able to hold around 10.000 tons of fish.
- Considerable improvement of the environmental footprint.
- Enhanced cooperation, as various SMEs can be benefited from this project through collaborations with NordLaks.
- Exploitation of know-how can benefit SMEs in the aquaculture industry.

Transferability

Due to the innovative fact that the intervention expands the areas that can be used for aquaculture while increasing the fish productivity, this new technology can be used by other countries too, so as to have greener farms in more/new places. Finally, the Havfarms are an important part of the Nordlaks future production strategy and the company envisage that it could constitute a model practice.

Further information (links, sources of information)

- <https://www.nskshipdesign.com/designs/aquaculture/fish-farm-2/fish-farm/>
- <https://www.nordlaks.no/havfarm/om-havfarm-prosjektet>
- <https://www.undercurrentnews.com/2018/02/14/nordlaks-signs-construction-deal-for-first-billion-nok-havfarm/>

4.8. Offshore site AQUALAVAGNA (Italy)

Practice description



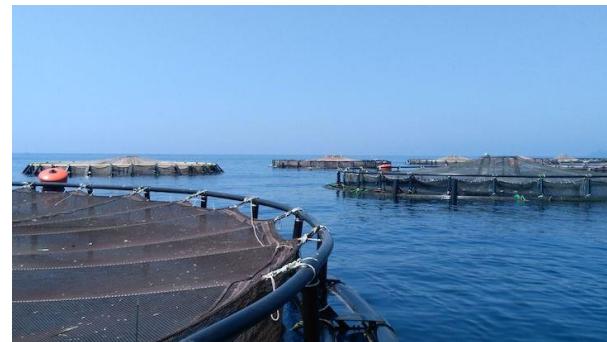
The proposed intervention in Aqualavagna employs business innovation strategies, technological innovation deriving from R&D, while encompassing alliances to increase capacity building and awareness regionally.

The practice comprises the following elements:

- Development of a wireless drone to be used in conjunction with the vessel responsible for delivering the food, capable of displaying any spillage of food from the cages.
- Development of a cage with horizontal sinking, structurally simplified compared to the system with bell, easier to install, with lower maintenance requirements and allowing good buoyancy.
- Development of more resistant nets to chewing and that slow down fouling, possibly through the combined use of high molecular weight polyethylene (UHMWPE) fibres.

Mission / Objectives

The objective is to improve the safety on onshore sites, optimize the product distribution, avoid food waste and increase the durability and resistance of fish nets, while reducing the risk of escapes and the need for maintenance in water.



Furthermore, it is crucial for the practice to contribute to the improvement of the technical and economic competitiveness of the off-shore farming cycle, which is currently more expensive than farming in sheltered sites (which, on the other hand, has a greater environmental impact and lower product quality).

Functions

The aim of this project is to develop technologies in order to improve the economic competitiveness of offshore aquaculture. Thanks to a strong and continuing growth in demand

and a stable fishing at the limit of overfishing, aquaculture has reached and will soon exceed the fish production. The excellent characteristics of the breeding site as well as the scrupulous attention to all the phases of the production, fishing and packaging process allow the achievement of a very high quality standard, difficult to find in fish bred in other realities.

Concerning product quality, thanks to strategic choices made in the design and to those pursued in the management, AQUA is able to guarantee its consumers the respect of a series of nutritional, organoleptic and food safety parameters that characterize the product offered. These parameters, are defined in an extremely meticulous way, legal limits have been employed in order to enforce verification procedures on all the lots marketed through laboratory analysis, while all products are certified by external laboratories.

Furthermore, regarding the quality of the marine environment, the characteristics of the site, along with a conscientious management, are crucial to reduce the impact of fish farming on the surrounding area. The practice ensures the following:

- Precise and balanced nutrition so to minimise waste and dispersion of solids in the water;
- Absence of antifouling substances on nets and mooring system;
- Absence of antibiotics in the feed to eliminate the possibility of risk from chemical pollutants and therefore from potentially harmful molecules for the ecosystem;
- Presence of constant current and the high seabed favor the dispersion and absorption of the organic substances naturally released by the fish making it impossible to accumulate under the cages.

Impacts / Results

It is observed that the results achieved over the years of activity of the AQUALAVAGNA site have rewarded the effort and the difficulties faced by the Company to offer a qualitatively superior product, allowing a constant growth of the diffusion of the product. Moreover the conceptualization and implementation of the project has brought together actors from both the public and private sector raising that way the level of dialogue and collaboration towards a common goal. Such harmonized effort has let to increase in productivity and thanks to the openness to new markets has also led to increase in revenues that allows the further development of the project with the adoption of innovative management solutions.

However, certain problems have occurred impeding the implementation of the project, such as gaps in regulation and limited support by local policy authorities and lack of expertise as in

the beginning of the initiative the know-how was not apparently sufficient. In addition, the complicated structure and the installation required a more frequent maintenance scheme. A complication is finally connected to food waste, since the roof of the net does not permit to check the fish feeding.

Transferability

The intervention of AQUALAVAGNA can be considered as a best practice for business innovation in aquaculture as well as for strategic alliance building. The aforementioned benefits of the practice can be easily disseminated and implemented in other European regions are many companies and producers face similar problems that need confrontation. Furthermore, this case has raised awareness especially nationally because of the growth in production and protection of the environment from non-environmentally sustainable aquaculture practices, and as such this helped to create new market routes. Therefore, accordingly this could be transferred and remodeled further in other areas.

Further information (links, sources of information)

- www.aqualavagna.it

4.9. Kefalonia Fisheries (Greece)

Practice description



This intervention has been founded and established in 1981 by Marinos Geroulanos, a fourth generation Kefalonian. It constitutes the very first farm for the production of European Sea Bass (*Dicentrarchus labrax*) and Gilthead Sea Bream (*Sparus aurata*) in Kefalonia, Greece. The substantial aim of the project

was to preserve the traditional way of life of the island through an innovative and sustainable professional practice, namely aquaculture. More than three decades later, Kefalonia Fisheries remains committed to excellence in the premium seafood markets. Kefalonia Fisheries strives to produce and deliver the freshest, highest quality Sea Bass and Sea Bream throughout the world. Kefalonia Fisheries is faithful to its principles to engage people to the creation of the finest products using traditional methods while, thanks to the company's social commitment has achieved to uphold an extensive network of employees and stakeholders.

Mission / Objectives

Sustainability is at the core of their philosophy at Kefalonia Fisheries. They offer a range of sustainably raised and organically farmed Sea Bass and Sea Bream guaranteeing that their fish are raised in the cleanest of environments and produced in a sustainable way - which means they are good for their customers and good for the environment.



At Kefalonia Fisheries they understand that they are beholden to the ocean and they are responsible for its care, so they work to make the gentlest impression possible and strive every day to deliver it to future generations in a better state. Their focus is on encouraging a cleaner, safer and healthier world for all.

Functions

- Dedication to preserve the time-honoured way of life on a Greek island, encompassing the fishing traditions to raise fish naturally, slowly and with the utmost respect for the environment and their welfare.
- Full transparency for the monitoring of their infrastructures environment and products' health.
- Fish grows slowly, as nature intended. Therefore additives or any other artificial means to speed up fish growth is not used. Feeding processes are accordingly adjusted in order to match exactly with food that fish would eat in the wild.
- Preparation and offering to the consumer with great responsibility, ensuring that products are packaged and transported using the finest and most up to date quality control systems.
- The company has built their name based on the unwavering quality and freshness of their fish, a result of the care they put into all their relationships: with their customers first and foremost, but also with their suppliers, employees and their community.

The company has acquired the following certificates:

- **Friend of the Sea:** Kefalonia Fisheries is one of just 100 aquaculture producers certified according to the Friend of the Sea standard for Sustainable Seafood.
- **Global G.A.P.:** The entire production chain is covered, from brood stocks and fry to suppliers of feed and on to farming, harvesting and processing.
- **ISO 14001:** These standards represent one of the most significant international initiatives for sustainable development and they apply to all of their products, services, activities, operations, facilities and transportation.

Impacts / Results



The company contributes to the resolution of environmental and socioeconomic interests as it is certified with principles that respect the environment, the consumer, as well as the well-being of the fish. Holding several certificates, Kefalonia Fisheries makes sure niche markets have their trusted supplier, and the ocean life has its trustful advocate.

Moreover, the worldwide standard for Good Aquaculture Practices at every stage of production (Global G.A.P. Aquaculture) and the Friend of the Sea standard for Sustainable Seafood ensures for increased productivity which can lead to more revenues.

Transferability

The adoption of several certificates and the fact that they produce premium organic products could improve their competition level, while promoting the adoption of such practices by aquaculture stakeholders in other European areas.

Further information (links, sources of information)

- <https://www.kefish.gr/>

4.10. Cromaris (Croatia)

Practice description



Cromaris is a Croatian aquaculture leader, specializes in growing, processing and sale of indigenous Adriatic fish and shellfish. Established in 2009 through merger of Croatian and European aquaculture pioneers. Cromaris fish is present in the European market for over 35 years leading in aquaculture business innovation. The corporate headquarters, fish sorting and processing facility are located in Zadar.

Cromaris have seven farms, two of which are located in Istria (northern Adriatic), and five in Zadar's area (central Adriatic). All farm locations are selected for their exceptionally clear waters and unspoiled nature, far away from any possible contaminants. More than 80% of the production is exported. The company has certified the majority of farming and processing actions. Until 2018 - more than 100 million EUR has been invested in technology for breeding, production and processing as well as investments will continue in the future with the intention of achieving the highest levels of industrial efficiency and current sales is planned to be increased on 10.000 tons of fish and shellfish from the Adriatic Sea.



Mission / Objectives

The mission statement of the company is dedicated to superior quality of the products because Cromaris is committed to provide high quality products to the consumers. The business is based on trust and mutual respect among employees, consumers, customers and other stakeholders.

Cromaris apply excellent manufacturing and hygiene practices. Continuous planning, implementation, verification and evaluation of the effectiveness of the conducted actions,

enable them to improve the efficiency of the system according to the principles of sustainable development.

The main objective of Cromaris is their market expansion, from local to international with respect to aquaculture. The pillar of this provision was to certify the quality and the seriousness of the business via certificates issued by authorized institutions, which refer on Traceability of product, Process control, products control, Environmental control and Control of incoming raw materials.

Functions

The company has acquired, applied and is audited on the following certificates:

Certification of production and production processes:

- **ISO certificate 9001:2008** (Quality Management System) - the most widely used international standard that sets out the requirements for establishment and maintenance of a quality management system
- **ISO certification 14001:2004** (Environmental Management Systems) - sets out the requirements for planning, establishing, implementing and monitoring environmental management systems.
- **ISO certification 22000:2005** (Food safety management systems) - sets out the requirements for establishment and maintenance of a comprehensive and effective food safety management system.
- **FSSC 22000** (Food Safety System Certification) - this standard includes the requirements of ISO 22000 (Food Safety Management System) and represents its upgrade.
- **HACCP** (Hazard Analysis and Critical Control Points) - an integrated food safety control system at all stages of production and distribution. It is based on a preventive approach, which contributes to reducing risks to comfort and health of the population.
- **IFS Food** (International Featured Standard) - ensures a high level of transparency throughout the supply chain of goods, i.e. transport of food. This service is designed for retailers, food manufacturers and companies dealing with standard auditing.
- **Global G.A.P.** - Aquaculture Standard sets criteria for legal compliance, for food safety, worker occupational health and safety, animal welfare, and environmental and ecological care.

- **Friend of the sea** - certificate of sustainable seafood from fisheries and aquaculture.



- **BRC (British Retail Consortium)** - standards guarantee quality and safety of food products and indicate compliance with the HACCP system, quality management systems, manufacturing requirements, product control, process control, personnel hygiene requirements.

Product certification:

- **Kosher** certificate - means that food is prepared according to Jewish dietary laws. All products are covered by this certificate.
- **Croatian creation (Izvorno Hrvatsko)** - mark of a quality Croatian product, awarded by the Croatian Chamber of Economy (HGK). More information at: <http://znakovi.hgk.hr/en>
- **Healthy living label** - the Croatian Institute of Public Health awards the "Healthy Living" seal of guarantee to products meeting the criteria stipulated by the Institute, the objective of which is providing additional information to consumers and providing them with a simple way of selecting food containing ingredients suitable for a healthy diet.
- Technical specification **STP80** - a certificate with which the independent certification body DNV GL Italia confirms that sea bream and sea bass which came from farming at all Cromaris farms were grown without any use of antibiotics.

The farm in Lim Bay is certified with organic production certificates:

- **Croatian ECO product** - means that their fish is farmed under strict rules attributed to this certificate which is based on the Organic Production Act.
- **EU Organic** - blanket EU certification for organic production.

- **AB** - the French version of the EU Organic Certification.
- **Bio Siegel** - German version of the EU Organic Certification.
- **Naturland** - German national certification for organic food.

Impacts / Results

The credibility of the company on environmental, socioeconomic, and public health issues is certified with ISO standards for quality, environmental management, food safety as well as for Organic fish farming. All the aforementioned have led to raising the practice's engagement in raising public awareness on sustainable aquaculture improving the capacity to address aquaculture related issues, while also fostering the adoption of innovative processes.

Transferability

All the demonstrated practices are available through International standards and could be achievable under dedicated consulting and business benchmarking process from other companies as well, as the European regions face common issues that need to be addressed. Today, the majority of the large aquaculture companies more or less use corresponding protocols and strategies. The adoption of above standards by small companies and the adaptation on their markets could improve their competition level. Furthermore, it can be argued, that demonstrated achieved results and benefits, have outweighed the investment costs, which in the Cromaris project exceeded 100 million. All the aforementioned, along with the dissemination of the innovative processes adopted at Cromaris could constitute a respectable model for other aquaculture entities to follow.

Further information (links, sources of information)

- <http://www.cromaris.hr/en/our-certificates-s39>

4.11. Aquaculture Stewardship Council - Seabass, Seabream and Meagre Standard (Netherlands)

Practice description



The Aquaculture Stewardship Council is an independent, international non-profit organization that manages the world's leading certification and labelling program for responsible aquaculture. The ASC was founded in 2009 by the WWF (World Wildlife Fund) and IDH (The Sustainable Trade Initiative) to manage the global standards for responsible aquaculture. ASC's standards were first developed by the Aquaculture Dialogues, a series of roundtables initiated and coordinated by the WWF.

The main intervention and scopes of ASC practices are to transform aquaculture towards environmental sustainability and social responsibility using efficient market mechanisms that create value across the chain. Recognize and reward responsible aquaculture through the ASC aquaculture certification program and seafood label, promote best environmental and social choice when buying seafood and additionally contribute to transform seafood markets towards sustainability. The ASC also ensures that the social rights and safety of those who work on the farms and live in the local communities are safeguarded.



Mission / Objectives

The ASC - Seabass, Seabream and Meagre Standard, based on the farm species *Dicentrarchus labrax* and *Sparus aurata* has been designed in order to cover mainly the good practices in the Mediterranean Sea and especially Greek companies which are the leading European producer, exceeding 110000 tones/year (FAO). Up to 78 percent of the Mediterranean marine fish (seabass and seabream) produced in Greece and are exported to 32 countries. The main objectives of the aforementioned practice are to:

- Recognize and reward responsible aquaculture through the ASC aquaculture certification program and seafood label.
- Promote best environmental and social choice when buying seafood.

- Contribute to transforming seafood markets towards sustainability.
- Help protect the surrounding ecosystems and biodiversity
- Set stringent controls for the use of antibiotics
- Reduce the use of pesticides and chemicals
- Require best practices that combat the spread of illness and parasites between farmed fish and wild fish
- Proactively prevent fish escapes
- mandate strict criteria for resources use and sustainable feed
- Regulate feed practices, reducing the amount of fish feed that drops to the water below
- Preserve the quality of the water
- Regulates where farms can be sited to protect vulnerable nature areas

The main needs for the application of this practice are to ensure that consumers can trust aquaculture farms products, following the basic principles of good environmental practice and protection of the marine environment. As aquaculture plays a major role in supplying food and social benefits, it is important for the consumer to know the production process, the environmental footprint of the product and to what extent the negative impacts of aquaculture on the environment. Based on the above market needs the main principles of this initiative are:

- Comply with all applicable national laws and local regulations
- Conserve natural habitat, local biodiversity and ecosystem structure and function
- Protect the health and genetic integrity of wild populations
- Use resources in an environmentally efficient and responsible manner
- Manage disease and parasites in an environmentally responsible manner
- Develop and operate farms in a socially responsible manner

The above ASC principles have met stringent performance criteria. The certified companies are issued by an independent conformity assessment body (CAB). The CAB, or certifier, carries out the assessment of the farms and decides whether they meet the necessary requirements to become ASC certified. This practice referred to as third party certification and it is widely recognized as the highest level of independent assessment.

Functions

The ASC - Seabass, Seabream and Meagre Standard promotes industry best practice to minimise the environmental and social footprint of commercial aquaculture. The practice promotes and guarantees the consumers, responsibly farmed products in the marketplace. For this reason, a Monitoring and Evaluation (M&E) program has been established to develop a framework for measuring the impacts and positive change the practice have on the environment, conditions for farm workers and on local communities. The functions of the Monitoring and Evaluation (M&E) program system entail the following:

- Articulate the Theory of Change
- Set an Environmental Monitoring program
- Define results chains with intended changes and unintended effects
- Set up data management system
- Define indicators to monitor and evaluate those changes and effects
- Create a mechanism to adapt the practice over time

Based on the above standard there are seven main principles, functions and criteria to minimize environmental and social impacts.

- a) Legal compliance (obeying the law, the legal right to be there)
- b) Preservation of the natural environment and biodiversity
- c) Preservation of water resources and water quality
- d) Preservation of diversity of species and wild populations (e.g., preventing escapes which could pose a threat to wild fish)
- e) Responsible sourcing and use of animal feed and other resources

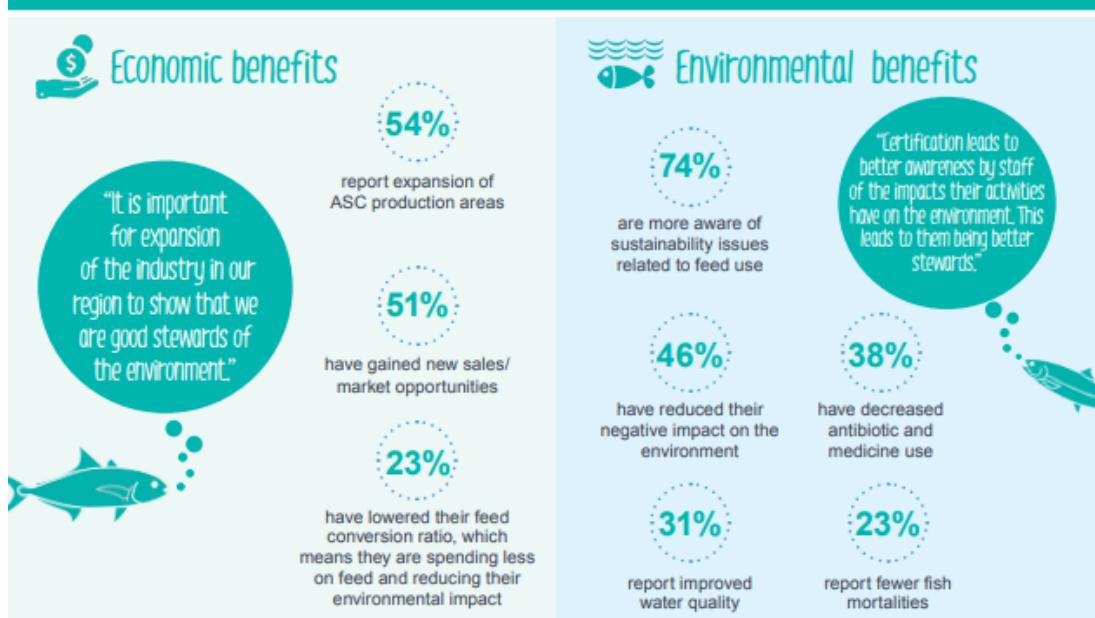
Impacts / Results

The implementation of the ASC has faced several problems deriving from gaps in regulation or limited support by local policy makers and authorities. Furthermore, local environmental conditions sometimes are not ideal, impeding the procedures.

Concerning benefits, ASC standards operate within a wide network of private sector food retailers all over the world. These private organisations and partners of ASC work together to fund and move the aquaculture sector towards environmental and social responsibility. The practice promotes industry best practice to minimize the environmental and social footprint of commercial aquaculture. Through consumer label they promote certified responsibly

farmed products in the marketplace. As a result, more and more consumers all over the world are interested in aquaculture food products that minimize the environmental and social footprint. Therefore, ASC standards offer many benefits in aquaculture SMEs, expanding their clients globally and increasing the added value of fish aquaculture products.

BENEFITS OF ASC CERTIFICATION



Transferability

Thanks to the certification provided by this intervention awareness is significantly raised and consequently consumers all over the world seem interested to engage with aquaculture and produce/consume food products that minimize the environmental and social footprint. Therefore, considering that ASC offer many benefits in aquaculture SMEs, expanding their clients globally and increasing the added value of fish aquaculture products, the practice can be easily transferable regionally.

Further information (links, sources of information)

- <https://www.asc-aqua.org/what-we-do/our-standards/farm-standards/sea-bass-seabream-meagre/>
- <https://www.asc-aqua.org/what-we-do/how-we-make-a-difference/monitoring-and-evaluation/>

4.12. BioMar (Denmark)

Practice description

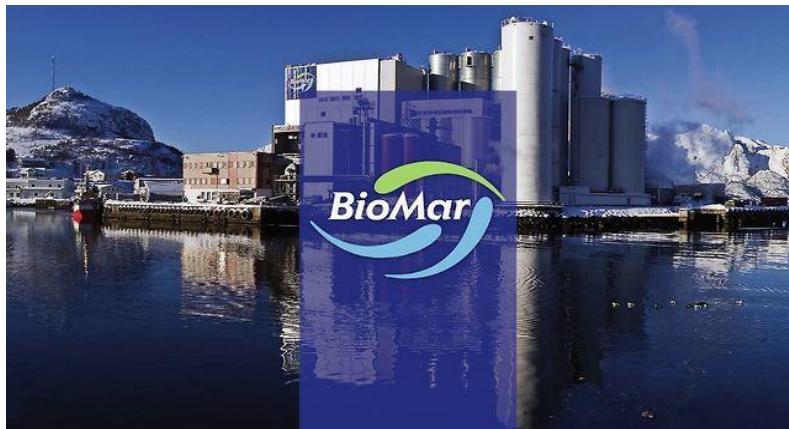


The company is positioned as one of the leading feed suppliers in the aquaculture industry. BioMar is a company where R&D, innovation, cooperation, sustainability and performance are strong pillars. The company aims are to continue contributing to the production of healthy and great tasting through

business innovation strategies, and capacity building awareness. BioMar acknowledges that a sustainable business must be built ensuring the fundamental rights of human beings. The Code of Conduct (CoC) of BioMar is essential to the way they operate their business. It requires that all employees, suppliers, contractors, and subcontractors comply with the below emphasized standards and provisions. Failure to comply with the principles set forth in BioMar CoC will result in corrective measures and may lead to s/contractor disqualification.

Mission / Objectives

Fundamental to adopting BioMar Code is the understanding that a business, in all of its activities, must operate in full compliance with the laws, rules and regulations of the countries in which it operates - including, but not restricted to labor and environmental issues. BioMar and their suppliers, contractors and subcontractors shall recognize and be committed to upholding the human rights of workers, and to treat them with dignity and respect as understood by the international community. BioMar is committed to ensure high standards of social responsibility. Part of the role of the company as a multinational company sourcing raw materials in the global market is to ensure their suppliers as well as their selves meet the standards outlined in the BioMar Code of Conduct.





Functions

BioMar and all its business collaborators must take care the labour legislation and the human rights in order to ensure the social responsibility on the sustainable way of production of goods and services. The BioMar Code of Conduct is based on the SA 8000 standard from Social Accountability International (SAI), which is founded on standards created by the International Labor Organization (ILO) and the United Nations (UN), and includes:

- Respecting and promoting human rights
- Ensuring health and safety in BioMar value chain
- Minimising environmental footprint
- Promoting fair competition
- Building long-term business relationships based upon mutual trust, openness and professional cooperation

Impacts / Results

The BioMar CoC principles have been processed and are currently welcome from both companies and internal stakeholders (staff& employees) as processes fostering innovation. This also pass to their market sub/contractors as recommendation. Biomar, appears to have significant benefits for the development of aquaculture in Europe, raising awareness on sustainable aquaculture, increasing productivity and contributing to the resolution of environmental and socioeconomic interests. The BioMar CoC principles targeting also their market collaborators. The CoC has implemented a scheme that when subcontractor fail to comply with its provisions they are either disqualified or corrective measures are imposed.

Transferability

The BioMar CoC principles is an aquaculture practice which is generally easily transferable to other territories as it has already an international reputation based on SA 8000 standard from SAI, and being founded on standards created by the ILO and the UN.

Further information (links, sources of information)

- <https://www.biomar.com/en>

4.13. Recirculation Fish Farm for food fish production (Finnforel Oy) (Finland)

Practice description



This is the first full-scale recirculation fish farm in Finland, having employed technological innovations to achieve higher sustainability rates for European aquaculture, while looking towards Russian markets as well. The practice's annual production is 1.000 – 1.300 tons of rainbow trout, accounting for 10 % of the national production of the rainbow trout. Fish farm is situated at the industrial area next to a paper mill, which creates beneficial advantages for both of the companies.

Mission / Objectives

Fish farm using the latest recirculation technology, which means a lot of lower nutrient emissions per used water than at the conventional fish farming. The cooperation with heavy industry (paper industry) is beneficial for both companies: fish farms gets energy from the paper factory and can use same water purification systems.



The Varkaus based Saimaan Tuore's recirculation aquaculture facility opened in February 2018 and it's a prime example of the method's eco-friendliness. It was granted an exceptionally generous environmental license with a production allowance of 1 million kilos. The Finnish environmental policy is highly committed on environmental issues and on nutrient pollution. Domestic fish demand exceeds supply and as a result, the ecological recirculation method has a pivotal role in increasing the Finnish fish production.

Functions

This intervention innovates by offering a new environmental friendly and effective industrial fish farming and processing scheme targeting the FORECA sector. The most important aspect for raising healthy fish is to provide clean and oxygen-rich flowing water. The project constitutes a brand-new recirculating aquaculture plant in Varkaus where water is circulated all the time. Throughout the process water is filtered, nitrogen compounds are converted into harmless nitrates, carbon dioxide is vented off, the pH levels are regulated, the water is oxygenated and the water temperature is precisely controlled. Best of all, the recirculating aquaculture system does not burden the environment.

The cautiously controlled conditions guarantee that the fatty acid contents are spotted, the precisely optimised cultivation environment means that the fish get exactly the right nutrients, while the regulated water temperature creates for the fish, perfect living conditions all year round. As a result, the Omega-3 fatty acids that are so healthy and important for humans are in perfect equilibrium. The development of activities and investments were partly funded by EU (EMFF). Funding from EU 2015-2017 reached approximately 2 million Euros. The rest amount of investment and costs was covered by companies (total costs about 13 million euros).

Impacts / Results

Since the project is relatively recent, the outcomes of the new technology adopted; as well as the economic and technological viability of the unit will be known within few years. It is observed though, that so far that the intervention has increased productivity and fostered the innovation adoption being already a prime example of eco-friendliness and model for recirculation aquaculture.

The recirculation aquaculture technology is very technical and expensive to build, but it comes with significant benefits. The living environment of the fish can be made optimal for the growth of the fish and the nutrient pollution caused by the farming is minimal thanks to the water circulation and purification. At the Saimaan Tuore facility all the outgoing water is directed to the Stora Enso paper mill's water treatment plant.

The Varkaus based fish farm is self-sufficient as the rainbow trout roe and fry come from the farm's own facilities in Hollola and Huutokoski. This enables control over the quality and

production at every step of the production cycle. The fine quality of the fish is guaranteed by continuously optimised sanitation and temperature.

Transferability

Aquaculture in Finland has been researched and developed for over 4 decades. Finnish recirculation technology, feeding systems, and genetic selective breeding are all among the best in the field. This knowhow is easy to export globally.

This Finnish knowhow has already been the basis for a development project in Vietnam where the aim is to establish a new trade for Vietnam's poor mountain regions. Finnish knowhow and fry material have been in demand in Russia as well with the promotion of aquaculture in the Russian Karelia and soon Moscow and St Petersburg where there are over 60 million consumers within a radius of under 200 kilometres. Therefore, it is visible that there is great export potential for this product due to its innovative processes. The facility model is easy to copy and take to where it benefits from synergy with industrial facilities. A recirculation aquaculture facility is not tied to the environmental conditions and therefore it can be taken closer to the consumers.

Further information (links, sources of information)

- <https://www.bioeconomy.fi/the-fish-of-the-future-grows-ecologically-indoors/>
- <https://en.saimaantuore.fi/ukk/>
- en.saimaantuore.fi

4.14. Good practice code for aquaculture breeding (Italy)

Practice description



API (Associazione Piscicoltori Italiana) is the Italian Fish Farmers' Association, established in June 1964. API is a professional category organization and aims to protect, develop and consolidate all fish farming activities both in inland waters and in marine and brackish waters. The Association promotes all interventions in the economic, scientific, technical, insurance, professional, trade union and legal fields that are necessary to achieve this goal.

Considering the provisions of art. 9.4 ("Responsible Aquaculture at a Production level") of the Code of Conduct for Responsible Fishing - FAO and the FEAP Code of Conduct for European Aquaculture, API has prepared the ***Code Of Good Practice For Breeding In Aquaculture***, spreading it and promoting it not only among its associates (300 companies - 750 farms), but also to all the actors involved (large supermarket brands - large retailers). From the above mentioned code, a process has started which is still ongoing, consisting of numerous publications over time, each of which is increasingly specific: Food Protocol and Good Practice Manuals relating to the hygienic aspect, validated by the Ministry for Agriculture, specific guidelines for product certification and various certification specifications to which the operators of the sector adhere, *vade mecum* for breeders indicating regulatory and operational tools (prepared in 2008 and recently restructured) and finally, a good practice manual for the fish species that examines all the various aspects and provides indications on how to move.



Mission / Objectives

The initiative was implemented in order to comply with the indications of the FAO and FEAP Codes of conduct, but also to guarantee adequate quality standards of Italian aquaculture fish, in particular for trout, sea bream and bass, and to indicate to its members and operators of

the sector, responsible and eco-compatible production guidelines. In particular, the primary objective is environmental and socio-economic sustainability. Hygiene and health of breeding, eco-compatibility of aquaculture, nutrition - food safety and traceability can be considered pre-requisites to obtain a responsible sustainability of breeding and meet, this way, the primary need for all, which is to have a product of quality.

Functions

The good practice code provides the standards to the operators of the sector to be followed as the main aspects of the aquaculture activity. In particular, on the subject of hygiene and salubrity of breeding, in reference to water quality, the aim is to guarantee the chemical-physical and biological characteristics suitable for the growth of the species bred and for its supply, having to be of the same quality and quantity sufficient to safeguard the health and well-being of the farmed fish.

Particular attention needs to be paid to the quality of waste water whose chemical-physical parameters must be within the legal limits (Legislative Decree 152/99 and subsequent amendments and additions); in reference to the welfare of farmed fish, the density of farmed fish, the exchange of water, the structures and breeding equipment must be adequately sized so to optimize the management of water resources and to safeguard the welfare of the farmed species.

In addition, unnecessary stress to the fish must also be avoided by adopting breeding procedures (selection techniques and preventive measures) that reduce manipulation and contact with stressors (avoid the introduction of diseases of viral, bacterial origin, parasitic, avoid contact with predators). The therapeutic agents (antibiotics, vaccines) necessary to prevent the spread of diseases must be used in compliance with the regulations in force.

Concerning the eco-compatibility of breeding, it is implied that aquaculture facilities must be designed so to reduce negative interactions with the environment and to ensure that aquaculture activity has the characteristics of long-term environmental sustainability. In the plants, measures must be taken to minimize the environmental impact and at the same time make it possible to enhance the water resources and guarantee the welfare of the farmed fish. Existing plants must pursue objectives of ever greater environmental sustainability.

Concerning food safety, the good quality of the food and the correct methods of administering them play a fundamental role in ensuring better water quality, good breeding performance,

and good health of the farmed fish, optimal quality of the meat of the fish bred in organoleptic terms and of hygienic-sanitary safety for the consumer. In reference to food for fish in aquaculture farms, it must comply with the current legal provisions on the subject, issued at EU and national level.

In particular, the following must be taken care of: the quality of the raw materials making up the feed, the formulation and packaging of the feed itself in order to satisfy the needs of the species bred in nutrients, to confer high digestibility to the food and at the same time to minimize deterioration of the aquatic environment. The origin and composition of special food possibly used in some stages of breeding (medicated feed, Artemia, additives) must always be safe and food must be used in compliance with current regulations.

Finally, traceability is an important component of the practice aiming to ensure greater safety and transparency of production processes, API promotes among aquaculture operators: labelling procedures, documentation systems, manuals, or other, to generate the sector towards the adoption of a "traceability system" of aquaculture products intended for consumption. All the above, together with the development over time of further publications supporting operators in sustainable production from an environmental point of view and from a socio-economic point of view, ultimately obtaining a quality product.

Impacts / Results

Some problems impeding the implementation process of the intervention rely essentially on funding and lack of financial resources. Furthermore, it is observed that most of the farms are micro and small businesses, complaining about the lack of reward for the application of good practices.

On the other hand, by providing up-to-date and clear indications to operators, it has certainly enabled the management of activities more in step with the times, giving support through the production of a quality product, the adoption of innovative technologies, access to new markets and consequently to an increase in productivity. Undoubtedly, thanks to years of targeted work, greater awareness has been created on the empowerment of aquaculture operators and their role also within the supply chain issues.

Transferability

Consumers are interested in buying and consuming products with high quality standards, which are not only available in Italy, but also in Europe and beyond; it is certainly a requirement common to everyone. To this end it is essential to refer to a framework, a regulatory framework that provides this guarantee. Normative indications, *vade mecum*, guidelines are easily transferable. The code and subsequent documentation was requested from the European Commission with particular attention to the production of caviar for which Italy is a leader at European level.

Further information (links, sources of information)

- http://www регистра-asa.it/it/normative/files/Piano_Strategico_Acquacoltura%20Italia%202014-2020.pdf
- <http://www.api-online.it/index.cfm/it/>
- <http://www.api-online.it/index.cfm/it/informazioni/codice-allevamento-in-acquacoltura/>

4.15. Project “Production and marketing plan of the national association of aquaculture and fish product producers” (Lithuania)

Practice description



NACIONALINĖ AKVAKULTŪROS IR
ŽUVŲ PRODUKTŲ GAMINTOJŲ ASOCIACIJA

The project has been implemented in the framework of the National Association of Aquaculture and Fish Product Producers (hereinafter – Association) was established on 4 April 2002, and on 30 June 2004, was recognized as the organization of the producers of aquaculture products. Association members manage about 9.640 ha of fishery ponds, various real buildings and a large number of machinery, mechanisms and equipment for the needs of aquaculture business. Using all of this, up to 5.5 thousand tons of commercial fish can be produced and about 1.600 tons of valuable juvenile fish maybe be raised per year. It accounts for about 98% of the total amount of fish produced in Lithuania.



Ecological fishery has started with the creation of the Association in order to address pollution observed in some fishery ponds. Actually, in fishery ponds of aquaculture enterprises, there are mainly raised carps accounting for about 96 percent of all fish produced. Therefore, members of the Association – aquaculture enterprises – carry out the renovation of fishery ponds by their own forces or by a contract. For this purpose, they use their own funds and support from the European Maritime and Fisheries Fund.

Association cooperates with scientific institutions, related associations, maintains contacts with foreign scientific institutions and aquaculture associations, and participates in international conferences. In this framework numerous projects have been implemented among them the project on “Production and marketing plan of the national association of aquaculture and fish product producers”.

Mission / Objectives

The aim of the project is to carry out the approved production and marketing plan of the Association for 2015-2017 at the lowest possible costs, to supply aquaculture products for the market according to the schedule and to receive the estimated revenue by increasing the value added of a part of the products and without a negative impact on the environment. The project is needed to integrate the members of the Producer Organization for multiparty



activities so to achieve the major anticipated results. The results would potentially comprise ensuring the viability of the members of the Producer Organization, and facilitating the assessment of the level of results achieved in the production of aquaculture products. Up to EUR 141.936 (i.e. 75 percent) of all eligible costs of the project were allocated for the implementation of the project. Project had been implemented from 2014 to 30 May 2018.

Functions

Project provides for the implementation of the following measures:

- To prepare and implement scientific and technical campaigns to improve knowledge of fish species and the environmental impact of the aquaculture and to promote the development of sustainable aquaculture practices;
- To effectively participate in the activities of various relevant aquaculture institutions at national, regional, European and international levels;
- To participate in the preparation of national strategic plans;
- To participate in the development of fodder traceability procedures;
- To establish markets for the sale of aquaculture products and mediate when supplying the products of producer organization members to the market;
- To participate in fairs and exhibitions at national, European and international levels in order to promote aquaculture products of the members of the producer organization;
- To develop and implement campaigns to promote aquaculture products.

Impacts / Results

The project has been employed within a wide and complex network of public and private business fostering the adoption of innovative practices and contributing to the development of considerable environmental and socioeconomic interests in the national level. It has assisted companies that are involved in the sector of aquaculture to grow, through funding and training projects. Therefore, it has significantly increased SMEs' productivity.

Finally the project has raised public awareness on sustainable aquaculture through the publication of multiple articles in mass media. During 2016-2017, 18 studies on sustainable aquaculture have been publicly published.

Transferability

Fisheries areas across the EU are facing similar challenges. Therefore both the association and this project can further enable local fisheries communities to address aquaculture challenges. In addition, due to the innovative fact that the intervention expands the areas that can be used for aquaculture while increasing the fish productivity, strategic alliances based on business innovation principles can be used by other countries too or even reach a regional level of cooperation in order to achieve common aquaculture goals.

Further information (links, sources of information)

- <http://www.akvakultura.lt/lt/>

CONCLUDING REMARKS

Aquaculture is becoming the world's fastest growing food industry, and currently accounts for over 50% of the total global seafood supply. Sustainable aquaculture growth is pivotal in every, interested in the sector, European country, as it is considered key to easing pressure on wild fish stocks, which are globally under stress as a result of overfishing. The industry is challenged with the responsibility of feeding a rapidly growing global population and, as worldwide seafood consumption increases, sustainable aquaculture production has to increase to keep up with demand.

It is important to mention in this framework, that the development of aquaculture is also translated into additional economic potential for the relevant stakeholders regardless that concerns about the environmental repercussions of such growth. Thanks to innovation and technology, however, the focus has shifted towards the longevity and sustainability of aquaculture,¹ as it is observable by the numerous practices that have been identified within the European Union during the last decade.

The most successful sustainable aquaculture practices that have been identified by the EXTRA-SMEs project partners in either local, national or regional/European level, capture the general trend mentioned right above. It is noticeable that in every case that has been examined in this Good Practice Guide, the major aim is to develop further the capacity of sustainability, with innovation being essentially one of the key drives to achieve that.

The 15 cases in this GPG include either innovative, highly developed technologically fish farms (7 cases), or strategic alliances of aquaculture stakeholders (8 cases) that are assembled in pursue of one common goal, buttressing the sector's sustainability. Fish farms from the cases are exemplary, as they have developed an unfathomable know-how and have rapidly encouraged the introduction and development of new technological instruments and innovative management systems in their business schemes allowing to grow significantly, increase their production and capacity and therefore their profit. In addition, the fish farms included in the GPG, contribute significantly to the promotion of sustainability and safety of aquaculture, not to mention that their impact considering their large share in the European fish market has potentially shaped aquaculture policies to further development.

¹ <https://www.weforum.org/agenda/2018/09/5-ways-to-guarantee-sustainable-aquaculture/>

Nevertheless, fish farms' projects constitute individual initiatives that could not essentially become possible if the companies involved were not initially resourceful and financially capable to invest in innovative technologies, offshore and inland infrastructures and certifications. Therefore, regional and local public authorities need to be more supportive to aquaculture companies, encouraging them to engage and provide them financial schemes that will facilitate their active involvement in the sustainable development of the sector.

The rest of the cases, and in particular 8 out of 15 good practices, constitute strategic alliances between fish farmers and/or aquaculture stakeholders and local/regional authorities, even NGOs, aiming to advance their production systems, increase their capacity and broaden their access to new markets, as a group is usually more trustworthy than an individual. In addition, certain cases such as the ASSG, the Doñana group, and the Lithuanian national association of aquaculture, have been formed in order to address sustainability issues in aquaculture through the enforcement of related codes of practice. This brings an added value to the practices as their objective is to shape the general practice towards aquaculture and cast the sustainable development of aquaculture as the prima axis to further project.

Finally, Member States will eventually be required to carefully plan the co-location of aquaculture amongst other marine activities, such as shipping and offshore energy, with the help of improved spatial data. This should ensure that all activities can benefit from synergies and that any negative environmental impacts can be minimised through their early identification and management.

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