AQUABEST RECOMMENDATIONS

Developing responsible aquaculture in the Baltic Sea Region

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Baltic Sea Region
Programme 2007–2013

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AQUABEST

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Aquabest recommendations for sustainable aquaculture development in the Baltic Sea Region

Aquabest has tested various paths towards sustainable aquaculture growth. Sustainability can demonstrably be achieved by implementing best technologies and practices, which would be subject to smart and efficient regulation. Recommendations for stakeholders are based on project activities and stakeholder dialogue, which are also documented in over 30 Aquabest working reports.

February 2014, Aquabest partnership

Recommendations for regulatory improvements

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Develop EU level guidelines on integrating aquaculture with water and marine strategy framework directives

- To facilitate sustainable growth, the need for aquaculture development should be explicitly recognised in the Water Framework and Marine Strategy Framework Directives.

Create a level playing field across food production sectors

- Legislative frameworks need to be developed in a manner that treats food production sectors equally in terms of licensing, societal acceptance, transparency and public subsidies.

Ease maintenance of existing permits

- When monitoring prove no risk for ecosystem resiliency, unnecessary administrative burden creates uncertainty about the future and may even reduce ability to invest in best technologies.

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Reduce the administrative burden of licensing

- Lead times can be significantly shortened without compromising environmental protection.

Promote the smart use of voluntary responsibility schemes

- Voluntary schemes cannot provide a substitute for regulation. In order to minimise possible conflicts with regulations, open dialogue between labelling organizations, environmental authorities and aquaculture industry is essential.

Define national priorities in legislative regulation development

- As a part of Common Fisheries Policy implementation through national growth strategies for aquaculture, countries in the Baltic Sea Region should define a set of national priorities for the improvement of aquaculture regulation.

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Find locations that enable sustainable practices

- Carrying capacity, minimized stakeholders conflicts and good conditions for operation and for the farmed species are the most important aspects for finding locations.

Seek stakeholder involvement throughout

- Consultation with stakeholders is a key factor in any successful aquaculture permitting process.

Provide the facts on aquaculture sustainability issues

- Local politicians, authorities and stakeholders must be thoroughly informed before, during and after a planning process.

Monitor for potential environmental impacts

- To ensure ongoing sustainability and to reassure stakeholders, aquaculture operations should undertake comprehensive environmental monitoring programmes.

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Track sources of phosphorus in regulated river systems

- Phosphorus retention data in regulated river systems should be analysed in order to curb excess Baltic Sea nutrient loading by the large scale farming.

Develop robust production systems tailored to Baltic Sea conditions

- Moving offshore should be a gradual process, the development of which should be supported by feasibility studies, pilot projects and public investment.

Give spatial planning legal status by linking it with licensing

- Spatial planning should be easily accessible to fish farmers and authorities, and the manner of interpreting such plans should be mutually agreed upon and well documented.

Recommendations for closing the nutrient loop in aquaculture within the Baltic Sea Region

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Agree on a common definition for Baltic Sea fish feed

- New farming with nutrient input and associated compensatory nutrient removal would not have to be located next to each other as long as the Sea's total nutrient balance remained at the targeted level.

Provide incentives for local sourcing of feed ingredients

- Any incentive system should be acceptable both to the business sector and to environmental authorities.

Avoid biased incentives by ensuring stakeholder consultation at every step

- Stakeholder discussions between the feed industry, fish farmers, environmental bodies, fishery authorities and academia are vital.

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Develop local sourcing of Baltic Sea fish meal to ensure more nutrient-neutral aquaculture

- Fish meal sourced from Baltic Sea fish is the most readily available fish feed ingredient sourced from the Baltic Sea itself. However, fish meal content of cost-effective aquafeeds is decreasing rapidly worldwide.

Help mussel farming achieve commercial viability

- Baltic Sea mussel meal is a locally sourced fish feed ingredient with clear environmental benefits, but such meal is not currently viable as a source of commercial fish feed.

Develop feed ingredients from waste streams and by-products

- Microbial proteins have the potential to be very sustainable from the point of view of resource efficiency and low carbon footprint.

Identify ways to make experimental feeds commercially viable

- Experiments with arctic char, turbot and rainbow trout feeds have shown that regional feed ingredients can be used in the production of high quality fish feeds.

Recommendations on implementation of new recirculation aquaculture system (RAS) technologies

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Determine the feasibility of advanced RAS farming technologies

- Feasibility evaluations are a prerequisite to investment in advanced farming technology. Studies must take into account all factors affecting viability.

Ensure that advanced technologies will increase revenues

- RAS farms must be large enough and, ideally, grow fish with a better market price than those bred using conventional technologies.

Solicit international expertise to gain RAS farm licensing knowledge

- National authorities must dialogue with RAS industry experts to build licensing bodies' competence in RAS farming best practices.

Ensure success through education, training and skills development across the value chain

- We strongly recommend a common and focused platform for cooperation on research, education, training and the exchange and transfer of knowledge, from research to farming practices.

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Code of Conduct

The purpose of the Code of Conduct is to provide principles and guidelines for governance, development and management of sustainable aquaculture at all stakeholder levels in the Baltic Sea Region.

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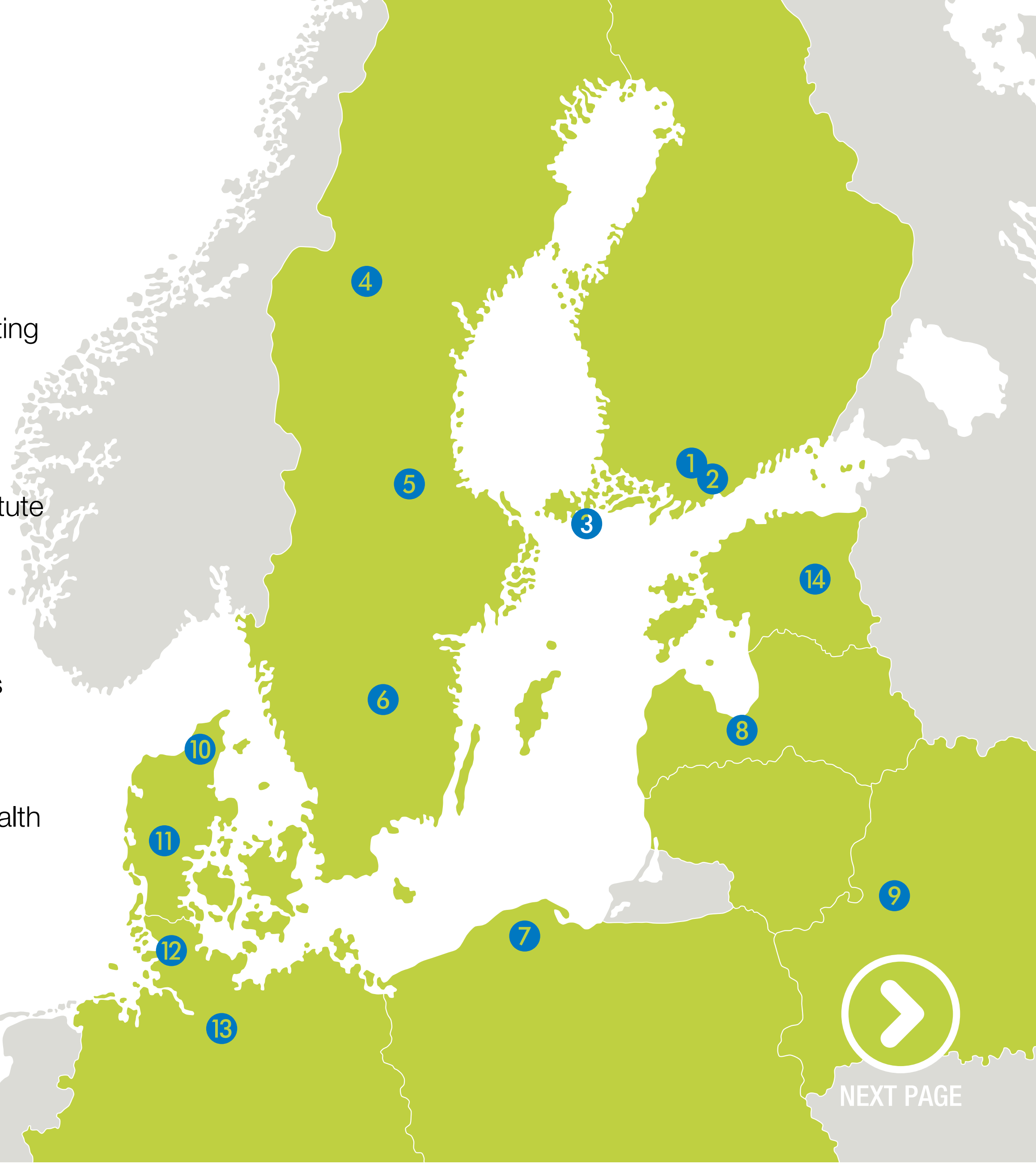
Partners

The Aquabest project has 14 partners, consisting of regional authorities, producer organizations, universities and stakeholders.

1. Finnish Game and Fisheries Research Institute
2. Helsinki University
3. The Government of Åland
4. Region of Jämtland
5. Swedish University of Agricultural Sciences
6. Swedish Board of Agriculture
7. Polish Trout Breeders Association
8. Latvian Institute of Food Safety, Animal Health and Environment
9. Belarusian State Agricultural Academy
10. Technical University of Denmark
11. The Danish Aquaculture Organization
12. GMA – Society / Association for marine aquaculture Ltd.
13. Johann Heinrich von Thünen Institute
14. Tartu University



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APPENDIX

Background

Compared to other primary food production, aquaculture in the Baltic Sea Region is in its infancy. Governance for the sector has not yet advanced beyond the original rudimentary framework. What this means is that as a livelihood based on food production aquaculture is linked to fisheries, but in terms of environmental policy it is considered a polluting industry. This has resulted in political and legal inconsistencies and inequities that are less apparent in the treatment of agriculture.

On a global scale, aquaculture has been growing quickly for some time, doing its part to fill the rising demand for food. It provides huge potential for increasing eco-efficient production of healthy animal protein. In the European Union, however, aquaculture production has stagnated and has even decreased in the Baltic Sea Region.

The culprit is vague and/or oppressive environmental regulation. At the official level, European and national strategies have striven for growth, but a well-intentioned emphasis on caution and control have resulted in regulation that makes it difficult to get into the business and to achieve economic viability. As a consequence, the European Commission has prioritised simplification of the regulatory framework in hopes of reducing the administrative burden and encouraging industry growth.

The primary aim of the Aquabest project has been to identify specific regulatory problems relating to aquaculture, thereby paving the way for smarter, incentive-based legislative and voluntary regulation of the industry within the Baltic Sea Region.

Aquabest activities

- Circulating a multinational stakeholder questionnaire to cast light on bottlenecks and opportunities in aquaculture development in the Baltic Sea Region
- Conversion of strategic sustainable aquaculture development goals into a Code of Conduct
- Completing a survey of the legal framework surrounding the environmental regulation of aquaculture in Baltic Sea Region states
- Undertaking a comparative study of licensing procedures in Baltic Sea Region states
- Charting the use and evaluating the feasibility of voluntary responsibility schemes for aquaculture in the Baltic Sea Region
- Developing a case study on the potential of incentive-based regulation in the Åland Islands
- Compiling a report on the current status of Baltic Sea Region aquaculture environmental regulations, including recommendations for improvement

Recommendations

Develop EU level guidelines on integrating aquaculture with water and marine strategy framework directives

The growth of the aquaculture industry is a high political priority in the EU. Its management, as well as that of the overall EU aquatic environment, is governed by stringent framework directives. These include goals for limiting or reducing nutrient loads, which are met in many cases by cutting production. To facilitate industry growth, the need for aquaculture development should be explicitly recognised in the Water Framework and Marine Strategy Framework Directives. This could take the shape, for example, of compulsory spatial planning that allocates aquaculture activities to specific geographical areas or river basins. Such planning could take place under the guidance of the Baltic Marine Environment Protection Commission (HELCOM).

Create a level playing field across food production sectors

All primary food production has an impact on nature. Due to presumptive legislative controls imposed via environmental permits, aquaculture is the most extensively regulated primary food production sector. Permits are focused on locally relevant parameters that do not take into account broader environmental impacts or the fundamental eco-efficiency of fish farming. Legislative frameworks need to be developed in a manner that treats food production sectors equally in terms of licensing, societal acceptance, transparency and public subsidies.

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Ease maintenance of existing permits
Securing the future of existing aquaculture operations alongside resilient ecosystems is essential to the growth of the industry. The current process of maintaining production rights is costly, constitutes an unnecessary administrative burden, and creates uncertainty about the future. Practices and procedures involved in maintaining production permits need to be simplified by streamlining procedures for renewal and review, and by lengthening periods of validity.

Reduce the administrative burden of licensing
Current licensing practices impose a heavy economic burden on all aquaculture stakeholders, effectively keeping entrants and investors out of the business. While environmental permits will prevail as a principal regulatory measure in aquaculture, lead times for licensing must be shortened. This can be facilitated through electronic processing; by ensuring that authorities, producers and consultants are completely up to date on new techniques and technology; and by making better use of existing official data. Lead times can be significantly shortened without compromising environmental protection.

Promote the smart use of voluntary responsibility schemes
Voluntary responsibility schemes are gaining ground. While their objective is more sustainable production, such schemes include criteria that conflict with the terms and regulations of permits. Voluntary schemes cannot provide a substitute for regulation. Permits should not include a requirement to apply for a new permit when switching to organic production. In order to minimise possible conflicts with regulations, open dialogue between labelling organizations, environmental authorities and aquaculture industry is essential. Together we can address control and monitoring, develop eco label criteria, and consider the inclusion of aquaculture products into public labelling schemes. Specific certification standards for Baltic Sea Region aquaculture should also be considered.

Define national priorities in legislative regulation development
Developing aquaculture regulation is a topical issue for all countries in the Baltic Sea Region. While many key problems are common to all, other issues vary from country to country depending on local legislation, type of production and natural conditions. In implementing the new Common Fisheries Policy, the European Commission aims to provide national growth strategies for aquaculture. As part of this, countries in the Baltic Sea Region should define a set of national priorities for the improvement of aquaculture regulation.

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Background

Since aquaculture is likely to play an important role in the economic future of the Baltic Sea Region, the need for space in the Sea and on land will almost certainly increase. In the "Strategic Guidelines for the Sustainable Development of EU Aquaculture" of 2013, the European Commission emphasises the importance of coordinated spatial planning within member states in order to secure the sustainable development and growth of aquaculture. Such planning will promote coexistence with other activities and civil society without compromising environmental sustainability.

To date, the spatial planning aspects of aquaculture have been poorly addressed. The Aquabest project proposes a common road map for locating sustainable aquaculture farms, free of conflicts with external interests, in the Baltic Sea Region. Successful aquaculture requires farm sites suitable to the species in question and to neighbours on land and in the water. Infrastructure such as roads and electricity are necessary parts of aquaculture. When poor sites are chosen, aquaculture can have a detrimental effect on the environment, as well as on the social and economic dimensions of sustainability.

Aquabest activities

- Review maritime spatial planning projects and processes with a view to creating a hands-on spatial planning manual for aquaculture in the Baltic Sea Region
- Elaborate regional spatial planning examples. Localise 10 sites for fish farms in the hydropower dam reservoirs in Jämtland, 10 sites for mussel farms in Kalmar, and incorporate these sites into municipality planning processes
- Engage in extensive consultation with stakeholders during planning processes
- Develop a technological manual on mussel farming technologies for Baltic Sea conditions as well as videos showing a mussel farm underwater and mussel harvesting
- Publish a study on wave and wind conditions in the northern Baltic Sea coastal area. Undertake a subsequent review of robust cage farming technology and its economic feasibility as an example of the implementation of a spatial plan

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Find locations that enable sustainable practices
There are three components to successful aquaculture spatial planning. Firstly, aquaculture operations require sufficient water of the right temperature and quality, as well as access to the necessary infrastructure. Secondly, aquaculture operations require ecosystems that have carrying capacities conforming to limits set by environmental requirements and goals. In this way, farming does not pose a risk to environmental protection goals, including the protection of endangered wild fish populations, sensitive habitats etc. Thirdly, successful aquaculture spatial planning requires the inclusion of consultation, transparent planning and adequate buffer zones to minimise conflicts with various stakeholders.

Seek stakeholder involvement throughout
Consultation with stakeholders is a key factor in any successful aquaculture permitting process. If stakeholders—local authorities, the local municipality, NGO's, the fishery sector, neighbours and landowners—participate in the planning process, they are more likely to accept that decisions will be made on a sustainable basis in the long term. To this end, we have created a manual that fish and mussel farmers can use to guide the consultation process. Open dialogue with all stakeholders, as part of a carefully planned consultation process, shortens permitting times and minimises social conflicts.

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Provide the facts on aquaculture sustainability issues
Regardless of the many efforts made to educate the public, aquaculture is still perceived as posing a considerable risk to the environment. New aquaculture undertakings need to educate the community at large. Local politicians, authorities and stakeholders must be thoroughly informed about the benefits of sustainable aquaculture: that it produces local, healthy, climate-smart food; is resource-effective; has a low carbon footprint; and creates jobs.

Monitor for potential environmental impacts
To ensure ongoing sustainability and to reassure stakeholders, aquaculture operations should undertake comprehensive environmental monitoring programmes. Such a programme must be implemented concurrently with the establishment of the aquaculture operation and provide neutral data on the environmental effects of farming. It should involve both frequent sampling of chief water quality parameters and, depending on local hydrological and ecological conditions, sampling of bottom fauna and the small organisms attached to underwater surfaces near farming sites. Sampling and analyses should be performed only by accredited staff and accredited laboratories.

Track sources of phosphorus in regulated river systems
Aquabest has demonstrated the carrying capacity of hydroelectric dam reservoirs with respect to new fish farming. However, we need more information on phosphorus retention in such river systems in order to curb excess Baltic Sea nutrient loading. We recommend implementing a model such as FyrisNP to calculate the transportation, retention and source-based apportioning of nitrogen and phosphorus. Such a model would enable the evaluation of the effects of point sources, for example fish farms, on the nutrient budget at various locations within a larger watershed. Fully understanding the effect of the aquaculture nutrient load would enable us to refine sustainable fish farming practices within regulated river systems.

Develop robust production systems tailored to Baltic Sea conditions
Spatial planning allocates room for marine aquaculture growth in exposed and offshore areas. In addition to offshore sites for the growing season, corresponding juvenile production and winter storage sites in more protected locations need to be identified. Offshore farming requires expensive technology and new knowledge. Moving offshore should be a gradual process, the development of which should be supported by feasibility studies, pilot projects and public investment. Education, training and competence development are also crucial.

Give spatial planning legal status by linking it with licensing
After careful consideration has been given to all possible aspects of aquaculture localisation, completed plans must be accorded some kind of legal status. Permit-granting authorities could then make use of approved plans, thereby streamlining the permitting process. Spatial planning should be easily accessible to fish farmers and authorities, and the manner of interpreting such plans should be mutually agreed upon and well documented.

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Background

Fish feed is the sole source of nutrient discharges from fish farming. Since feed ingredients are largely imported from outside the Baltic Sea Region, fish farming causes net nutrient import to the Sea. To improve the sustainability of aquaculture in the Baltic Sea, Aquabest has investigated the use of local ingredients such as Baltic Sea-sourced fish meal, mussel meal, and microbial as well as plant proteins.

Using regional marine ingredients in fish feed would potentially create a closed nutrient loop within which aquaculture would re-circulate existing nutrient sources, introducing fewer new nutrients into the Baltic Sea catchment area. Using cost-effective, regional ingredients would also be beneficial to the regional economy. However, both the availability and cost-efficiency of these new feedstocks is uncertain and the short-term ecological benefits are still in question.

Aquabest activities

- Holding stakeholder workshops with over 60 participants to determine the risks and possibilities involved in increasing the use of raw Baltic Sea materials in fish feed
- Feeding pilot projects involving the testing of various regional ingredients on Arctic char, turbot and rainbow trout in order to determine suitability for use in Baltic Sea Region aquaculture
- Piloting the production of mussel meal made from Baltic Sea mussels
- Piloting the production of yeast biomass from waste materials and the use of plant proteins in fish feeds
- Building a model to ascertain the likely advantages of using local ingredients in fish feeds with respect to reducing nutrient inflows into the Baltic Sea

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Agree on a common definition for Baltic Sea fish feed

Eutrophication is the gravest threat facing the Baltic Sea. Fisheries-integrated aquaculture can effectively slow eutrophication by removing nutrients from the sea and returning them to food production. This beneficial process should be encouraged by means of incentive mechanisms for nutrient removal and recycling within the regulatory systems governing aquaculture. The aim of sourcing fish feed from Baltic Sea marine ingredients is to balance the Sea's overall nutrient budget. New farming with nutrient input and associated compensatory nutrient removal would not have to be located next to each other, or even nearby, as long as the Sea's total nutrient balance remained at the targeted level. It would not be a question of returning the same nutrient molecules to the Baltic Sea. Feeds based on a "molecule-to-molecule" nutrient loop can be produced in experimental quantities, but are not currently feasible.

Provide incentives for local sourcing of feed ingredients

Clear incentives are required to persuade fish farmers to adopt a feed based on regional ingredients. Use of regional ingredients could also be encouraged through international policy papers and recommendations, while incentives could be introduced under national regulation. Any incentive system, however, should be acceptable both to the business sector and to environmental authorities. For the business sector, the challenge lies in the logistical undertaking of providing these ingredients to the feed industry in the proper quantities and at a viable cost. For environmental authorities, the challenge lies in creating an efficient, transparent system involving monitoring and documentation.

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Avoid biased incentives by ensuring stakeholder consultation at every step
Stakeholder discussions between the feed industry, fish farmers, environmental bodies, fishery authorities and academia are vital to outlining the scope and complexity of issues involved in aquaculture decision making. There is no panacea for improved nutrient recirculation in aquaculture in the Baltic Sea; solutions will take time to develop and may be difficult to implement. Building consensus among stakeholders will both accelerate the process through knowledge sharing and render any solution identified more acceptable.

Develop local sourcing of Baltic Sea fish meal to ensure more nutrient-balanced aquaculture
Fish meal sourced from Baltic Sea fish is the most readily available fish feed ingredient sourced from the Baltic Sea itself. Baltic herring and sprat stocks are strong and could be sustainably harvested to feed an expanded aquaculture sector. This would encourage nutrient recirculation, but it might prove unsustainable from a cost point of view. Since the fish meal content of cost-effective aquafeeds is decreasing rapidly world-wide, relying on moderate to high fish meal content for aquaculture in the Baltic Sea could become an economic burden.

Help mussel farming achieve commercial viability
Baltic Sea mussel meal is a locally sourced fish feed ingredient with clear environmental benefits. The Aquabest project tested a new processing method for producing mussel meal with low shell content, but high production costs coupled with the low growth rates of mussels in some parts of the Baltic Sea showed that mussel meal is not currently viable as a source of commercial fish feed. As fish meal prices continue to increase, however, the use of Baltic Sea mussel meal in feed could achieve viability. It is therefore important to continue supporting a higher volume of mussel farming and to develop the production process and logistics chain required to make mussel meal available in commercial quantities.

Develop feed ingredients from waste streams and by-products
Several promising waste materials from the food processing and forest industries have been tested as substrates used to grow yeast strains for fish feed. The next steps would involve selecting the best raw material and scaling up biomass production. Use of microbial protein in fish feeds would not directly reduce nutrient emissions from aquaculture in the Baltic Sea, but such ingredients have the potential to be very sustainable from the point of view of resource efficiency and low carbon footprint.

Identify ways to make experimental feeds commercially viable
Experiments with arctic char, turbot and rainbow trout feeds have shown that regional feed ingredients can be used in the production of high quality fish feeds. In every case, fish grew well and utilised the nutrients effectively. Detoxified Baltic Sea fish meal proved safe, as it did not lead to any signs of cell toxicity. It also proved to be an environmentally sound feed choice. Harvesting underutilised species for fish meal resulted in actual reductions in net ecosystem nutrient load.

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Recommendations on implementation of new recirculation aquaculture system (RAS) technologies

Background

The aquaculture industry in the Baltic Sea Region has the potential to develop and grow. The introduction of innovative, cost-effective and environmentally efficient technologies will help the industry to flourish while minimise negative environmental impact on the Baltic Sea. Such technologies have been developed in Denmark in reaction to very strict aquaculture production environmental legislation. Technologies developed in Denmark have led to the creation of a rather unique recirculation farming concept, the so-called Model fish farm, for freshwater farming. Based on this model, major environmental benefits have been achieved in a commercially viable manner: more fish can be produced without increasing environmental impact.

To be suitable for Baltic Sea aquaculture, technologies and processes would need to be adapted to brackish or salt water aquaculture in coastal areas with limited access to fresh water. In addition, more efficient nitrogen removal from wastewater would allow greater production without increasing nutrient discharge.

Aquabest activities

- Developed feasibility study guidelines
- Conducted a feasibility study in Belarus involving the practical application of the guidelines
- Generated a generic economic feasibility model based on common spreadsheet programs
- Developed methods of nitrogen removal for brackish and marine conditions
- Conducted an evaluation of the impact of chemical additives for water quality improvement and microbial load control
- Held a training course on knowledge transfer concerning recirculation aquaculture technology in the Baltic Sea Region

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Recommendations

Determine the feasibility of advanced RAS farming technologies
Aquabest has developed feasibility study guidelines to serve as a reference for authorities and for entrepreneurs looking to adopt recirculating aquaculture system (RAS) technologies. Feasibility evaluations are a prerequisite to investment in advanced farming technology. Studies must take into account all factors affecting viability including environmental compliance and licensing, market availability and readiness, cost structure, engineering requirements and employee training.

Ensure that advanced technologies will increase revenues
RAS technologies have proven to be economically viable. In order to assure viability, however, feasibility studies as well as real life case studies clearly show that RAS farms must be large enough and, ideally, grow fish with a better market price than those bred using conventional technologies. Investments in environmental technology should therefore be incentivised so that farming can be expanded in line with the expected decrease in specific nutrient loads that RAS promises.

Solicit international expertise to gain RAS farm licensing knowledge
Licensing authorities tend to build national standards around target emission levels as well as Best Available Technology (BAT). In situations such as that surrounding RAS technologies, where development brisk and new practical information from large commercial projects is coming to light all the time, knowledge sharing is essential. National authorities must dialogue with RAS industry experts to build licensing bodies' competence in RAS farming best practices.

Ensure success through education, training and skills development across the value chain
Education, training and competence development among skilled staff is crucial to the implementation of new, innovative technologies and to the development of an efficient aquaculture sector. Although advances have been made in end-of-pipe nitrogen removal, RAS farming technology suitable for Baltic Sea coastal conditions is not yet mature. We strongly recommend a common and focused platform for cooperation on research, education, training and the exchange and transfer of knowledge, from research to farming practices. Equally crucial is the integration of biological and technological research with the education and training of skilled professionals and staff at relevant public authorities.

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