SUSTAINAQUA

Integrated approach for a sustainable and healthy freshwater aquaculture

The Challenge

Aquaculture has developed rapidly over the last decades, due to the combination of strongly increasing demand for seafood products and depleted fish stocks in the world's oceans. European freshwater fish farmers are fighting a battle on two fronts. They must compete with low-cost producing countries in Asia or Latin America and, at the same time, they need to conform to stringent European and national legislation regarding product quality, environment and fish health. The success of Europe's freshwater aquaculture sector depends to a great extent on farmers' abilities to face these challenges.

In order to achieve a healthy and truly sustainable development of the sector, European aquaculture needs to be environmentally sound, economically viable and socially acceptable. Ultimately, each aquaculture farmer faces the same challenges: how to reuse water most efficiently and improve wastewater treatment to decrease its discharges? How to use feed more effectively and reduce nutrients in the effluent? How to meet all the legal requirements and restrictions, demonstrate to consumers that the cultured products are of the highest quality, produce in environmentally friendly systems, generate sufficient income for the farmer, and secure the jobs of employees?

The three-year collective research project SustainAqua aimed to answer several of these questions. In five different case studies in Hungary, Poland, the Netherlands, Denmark and Switzerland, representing the most relevant freshwater aquaculture systems and fish species in Europe, the project consortium developed and researched different options for upgrading existing aquaculture farms in the direction of product diversification, quality improvement, and optimisation of production processes.

Project Objective

SustainAqua aimed to improve the image of European farmers and to make them competitive by training them in producing tasty, high quality and sustainably-farmed products. Various practical techniques were tested, on how to strengthen the diverse aquaculture farms in Europe in a sustainable way, from extensive and semi-intensive pond systems, which predominate in Central and Eastern Europe, to intensive recirculation aquaculture systems (RAS) as they are practiced in North-Western Europe.

The overall objective of the project was to train freshwater aquaculture farmers to:

- Improve production methods, process efficiency and profitability
- Increase growth performance of fish;
- Reduce energy costs by increasing energy efficiency;
- Reduce wastewater treatment costs by decreasing wastewater volume and waste discharge;

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EATiP *Thematic Area of Relevance*

TA1: Product Quality, Consumer Safety and Health
TA2: Technology and Systems
TA3: Managing the Biological Lifecycle
TA4: Sustainable Feed Production
TA5: Integration with the Environment
TA6: Knowledge Management
TA7: Aquatic Animal Health and Welfare
TA8: Socio-Economics and Management

Key Words

Freshwater aquaculture, diversification, sustainability, product quality

Project Information

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SMEs-Collective research projects
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- Reduce costs for fish feed by higher nutrient utilisation efficiency;
- Reduce labour costs per produced product;
- Research potential market applications of different aquaculture by-products for the energy and cosmetics industries;
- Increase product quality (taste, nutritional value) as marketing tools to boost consumer acceptance of farmed freshwater fish and thus, to improve the industry's image.

Key Points

- To encourage the development towards an environmentally sound and healthy, and at the same time economically viable and socially acceptable freshwater aquaculture.
- To expand the knowledge base and the commercial image of European freshwater aquaculture farmers by training them to:
- Diversify their markets/ products/ services (e.g. through diversification of fish species, innovative by-products as valuable resources for the chemical, the cosmetic, the energy or the food industry)
- Improve their product quality (taste and compounds; reduction of medicaments and antibiotics), and with this consumers' confidence and acceptance
- Improve their production process efficiency and profitability
- To improve farmers' ability to compete with low-cost aquaculture products from Asia, Latin America and the Caribbean.
- To respond to European and national, legal and customers' (supermarkets, individuals) requirements related to product quality and environmental and health issues.
- To provide a product of high nutritional value to the consumer (fish quality).
- To strengthen the sustainable development of rural areas by creating employment opportunities throughoutthe whole aquaculture production chain.

Output Highlights

SustainAqua had significant achievements to its credit in terms of research, training, and dissemination. The results delivered by the project add substantially to the existing knowledge about freshwater farming and show European farmers in detail some of the ways that will make their operations more sustainable and more competitive. Proof of the positive impact of SustainAqua on the European aquaculture industry and research sector alike are the highly successful training and dissemination activities carried out in the framework of the project.

Training courses
Over three months during summer 2009 a total of twenty-one training courses were held for aquaculture farmers and technicians in eight countries. The courses were held over either one or two days and attracted altogether almost 600 participants. An analysis of the questionnaires filled out by the participants revealed a high degree of satisfaction with the course programme and content and interest in implementing the SustainAqua modules. These are methods developed in the project to make fish farming more sustainable, to increase product quality, to optimise production processes, and to diversify the range of products.

E-learning courses
In June and July 2009 two e-learning courses were conducted for aquaculture practitioners interested in sustainable fish farming. Each course was spread over four days with ninety minutes of instruction that focused on a different topic each day. The principles of sustainable aquaculture, and the case studies took up the first three days while the last day was dedicated to legal issues and a review. These courses too were highly successful, reaching up to 50 students and aquaculture professionals, who assessed the programme very positively.

SustainAqua handbook
Another substantial output from the project was a handbook for aquaculture farmers, a practical guide to sustainable freshwater fish farming. Over 110 pages long the handbook details the core of the project, the five case studies that were carried out on different species in five countries. The handbook is intended as a manual for the fish farmer and each of the chapters on the case studies ends in a section that describes how the methods developed in the case study to achieve specific results can be scaled up to actual farm proportions.

The handbook also includes an overview on production methods and technologies used in the main freshwater farming systems in Europe and a review of European legislation in the field. Information based on the case studies on techniques to improve product quality, to diversify production into potentially valuable wetland crops, as well as to grow fruit and vegetable in combination with fish, is also provided in the handbook. The book was distributed at the training courses in the local languages and is available for download from www.sustainaqua.org in twelve languages (http://www.sustainaqua.org/index.php?option=com_content&task=view&id=75&Itemid=86). Judging from the feedback the practical nature of the handbook was widely appreciated by participants as well as the trainers at the training courses.

Sustainable aquaculture wiki

The purpose of the SustainAqua wiki (wiki.sustainaqua.org) is to assist an aquaculture farmer to decide whether and how his or her farm can operate more sustainably or become more competitive. The information in the wiki is based on the work carried out in the case studies and the results generated by this research. The wiki is constructed so that the information is classified in a clear and transparent manner allowing the user to easily navigate to the pages he or she finds most relevant. In each of the case studies, for example, the purpose of the research is described and how it was carried out as well as the benefits and constraints of implementation. In some of the case studies additional suggestions on ways to improve water quality or reduce emissions have also been provided. Users can also find information related to particular topics. For example, if a farmer is interested in reducing energy consumption he can go directly to the section on the Manure Denitrifying Reactor (MDR) under the Dutch case study or to the page on constructed wetlands that describes how biofuel crops were raised in the Hungarian case study. Other concepts that were researched within the project such as polyculture, constructed wetlands, and advanced recirculation can also be conveniently accessed from the menu system.

The idea behind developing a wiki was to create a core of information to which members of the public could add their knowledge. The wiki has been opened to the public who currently have read-only access to all the information in the wiki. Only registered users will be entitled to make changes to the wiki.

Next Steps – Suggested Actions/Follow On

Policy

1. Funding opportunities for further research and demonstration

- Within the project, the different approaches in the EU towards sustainable aquaculture were assessed, giving recommendations for sustainability quality standards, based upon the results of SustainAqua and of other initiatives, such as CONSENSUS or the WWF aquaculture dialogues. Furthermore, the need for further research activities was summarised, based upon the first results of the European Aquaculture Technology Platform which were not published at that time, and the experiences of SustainAqua and its consortium members.
- What is needed most to follow on the results of SustainAqua would be specific further calls in the frame of FP7 to take the next steps in researching, further developing and demonstrating the various modules of the case studies. The instrument “Research for SME-IAGs” is only partly suitable for aquaculture. Aquaculture farmers are struggling to compete and survive, and so their associations cannot rely on high levels of funding from their members. Aquaculture associations in Europe therefore cannot contribute financially to such projects to the extent foreseen in this instrument. A funding rate, as was implemented in the Collective research project in FP6 was just sufficient and helped IAG’s a lot to train their members and transfer the knowledge that was accumulated within the project by the researchers and the other consortium members.
- To be able to continue the good and successful work of SustainAqua, which was also highly acknowledged in the Commissions assessment of the project, it would be necessary to publish topic related calls for extensive and semi-intensive freshwater aquaculture, highlighting the participation of SMEs and associations in the consortium and budget distribution.

2. Marketing of sustainable aquaculture

- The freshwater aquaculture sector in Europe lacks the following:
  - In contrast to comprehensive market studies about marine species, commercial information about the freshwater fish market is lacking.
  - Freshwater aquaculture suffers from a low market value of its products, a limited product range, inadequate marketing methods, a negative image and a general lack of promotion.

  Thus, one of the most urgent problems of European freshwater aquaculture farmers does not relate

to the production but to the marketing side. To strengthen their competitiveness, it is a must to analyse the freshwater fish market in detail, to find out what consumers exactly want, what their requirements with respect to products are, and to develop professional marketing strategies. SMEs have neither the personnel nor the financial resources for these activities.

- European aquaculture producer associations recognise the urgent need to improve this situation, but they too lack the funding to assist their members in such marketing initiatives.
- Therefore, instruments that help the freshwater aquaculture sector to carry out the following are urgently needed:
  - conduct in-depth market research to identify recent trends and get an up-to-date picture of the sector
  - assess consumer's behaviour and attitude towards aquaculture products
  - help farmers to define and establish new niche markets which are often the most promising markets for SMEs;
  - provide regionally adaptable marketing tools for farmers to improve their marketing activities and optimise their production according to market and consumer demands;

3. Promotion of European freshwater aquaculture

- Most consumers in Europe are not aware of the importance of freshwater aquaculture. A professional promotion campaign on the advantages of European fish products in terms of environment, economy and social aspects is highly needed. Again, the organisations responsible for such a campaign do not have the funding for such an approach.

Knowledge Transfer

- The SustainAqua webpage and wiki serve as platforms for the transfer of the generated knowledge. The approach by the Collective Research (or now Research for SME-AGs) - to ensure the direct transfer of knowledge through training courses conducted by the IAGs for their members - proved highly successful in SustainAqua, but cannot be continued within FP7 due to the insufficient funding for IAGs and SMEs in this instrument.

RTD

- The participating RTD's are still in contact with each other 2 years after the end of the project and develop new project ideas together. The overall aim is to apply for a follow-up project to SustainAqua, but so far, insufficient open calls on this topic have hindered success.

SME

- The same counts for SMEs. The contacts between SMEs and RTDs still exist and cooperation continues. For instance, ttz Bremerhaven developed together with ABT a "Research for SME's" project that is currently being executed (Cleanhatch).

Related Publications/Projects

Martins C. I. M., Eding E. H., Verdegem M. C. J., Heinsbroek L. T. N., Schneider O., Blancheton Jean-Paul, Roque D'Orbcastel Emmanuelle, Verreth J. A. J.: New developments in recirculating aquaculture systems in Europe: A perspective on environmental sustainability. Aquacultural Engineering, 2010-11 , Vol. 43 , N. 3 , P. 83-93

Further publications are planned by the RTDs.