

## SEAFARE : WORKING TOWARDS A MORE SUSTAINABLE FUTURE FOR AQUACULTURE

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The aquaculture industry is an important contributor to economic well-being, particularly in rural peripheral areas of the Atlantic Area. Aquaculture is developing in line with the EU's commitment to high levels of environmental protection and complying with legislation that is based on the precautionary principle. Stringent EU regulations generate competition from other world regions, such as Asia and Latin America. For the past decade, the EU aquaculture sector has stagnated, a situation that is in stark contrast to global growth. In order to increase the EU aquaculture industry's growth it is essential that the industry resolves a number of issues relating to sustainability and legislative issues. Both these issues represent significant bottlenecks which need to be overcome. Sustainable development in coastal and marine areas involves the promotion of economic development that does not pose a threat to our natural heritage. This reflects the basic fact that human activity cannot be allowed to proceed at the expense of natural ecosystems. While aquaculture developments bring welcome economic and social benefits, associated pollution and other negative ecological impacts are a valid cause for concern. The aquaculture industry has managed to reduce its dependence on medicines and disinfectants to treat fish diseases and has improved the efficiency of diets and feed systems which has reduced the release of nutrients and other chemicals into the environment. However, there is still plenty of room for improvement and the need to promote sustainable aquaculture practices is as great as ever.

The SEAFARE project is addressing the potentially negative impacts of aquaculture by developing and promoting environmentally sustainable technologies. In response to the urgent need to increase the sustainability of the aquaculture industry, SEAFARE is designing and providing tools to SMEs and public authorities to help them implement sustainable and environmental friendly aquaculture practices. The SEAFARE project is strengthening the links between researchers and industry, and influencing policy development at regional and national levels. The project is delivering innovative solutions for coastal zone management and the protection of habitats by contributing to the sustainable management of economic activity.

The main objectives of the project are (1) to promote diversification of the aquaculture industry by providing a greater range of species and alternative production systems, (2) to protect sensitive coastal environments through the development of novel integrated farming systems in sensitive wetland habitats and to minimise impacts of aquaculture discharges through the use of wetlands as natural biofilters, and (3) to assess the dangers associated with introduced aquaculture species using Pacific Oysters as a model.

### **(1) Promoting diversification of the aquaculture industry by providing a greater range of species and alternative production systems.**

To achieve this objective, SEAFARE is (i) determining the usefulness of genetically selected strains to contribute to sustaining European flat oyster (*Ostrea edulis*) and sea bream (*Diplodus*) populations along the Atlantic Coast of Europe, (ii) assessing the physiology of growth performance of alternative ingredients to develop diets to maximise production of

bream species (*Diplodus*), (iii) developing systems for microalgal biomass production for aquaculture feed by assessing new microalgal properties for fish larval development, and (iv) using technology to conserve and restore threatened species by developing rearing protocols for different life stages of the European smelt (*Osmerus eperlanus*).

## **(2) Protecting sensitive coastal environments through the development of novel integrated farming systems in sensitive wetland habitats and minimising impacts of aquaculture discharges through the use of wetlands as natural biofilters**

The restoration of wetlands for sustainable exploitation began with the development of techniques to help optimise the ecosystem functions of wetlands and combining these with economically beneficial farming practices. A model for zero-discharge fish production systems that can be integrated with wetland rehabilitation for ecological and economic sustainability has been tested. As has a model for developing extensive production of marine fish in constructed wetland lagoon systems. The SEAFARE project has optimised periphyton-based nursery systems for marine fish in wetland lagoons by testing the contribution of periphyton to nutrition, growth, and quality of fish using different substrates within replicate enclosures. The project constructed wetlands using the halophytic plant *Salicornia* as a sink for nitrogenous waste and conducted experimental production of polychaetes and shrimp to assess their feasibility as secondary production in integrated pond systems.

## **(3) Assessing the dangers associated with introduced aquaculture species using Pacific Oysters as a model**

The partners started by surveying key sites along the coasts of Portugal, Spain, France, the United Kingdom and Ireland for the presence of naturalised populations and then went on to assess the abundance and temporal dynamics of Pacific oysters (*Crassostrea gigas*) in selected populations. The SEAFARE project has sampled naturalised and aquacultured Pacific oysters for genetic analysis and investigated the ecological impact of naturalised Pacific oyster populations on native marine communities. The last stage of the SEAFARE project involves the exploration of the biological and physical factors affecting the rate of range extension of naturalised populations and the study of temporal variation in annual spatfall and recruitment at selected sites using molecular genetic markers. By comparing growth and physiological performances between northern and southern naturalised populations, the partners will be able to test for local adaptation and in a concluding step they will propose management strategies to minimise the ecological and economic impact of the naturalisation of Pacific oysters.

The SEAFARE project addresses important issues about conducting sustainable aquaculture. The knowledge generated by the project will be transferred to the private sector and to other stakeholders (i.e. coastal policy makers, conservationists etc.). The SEAFARE project is dedicated to solving specific problems within industry and delivering workable solutions to achieve a more sustainable future for aquaculture.