CSI–Europe (Current marine Science Investigations in Europe)

Working towards sustainability

An Ecosystem Approach to Sustainable Aquaculture (ECASA)

By Kenny Black and Averil Wilson

ECASA (An Ecosystem Approach for Sustainable Aquaculture) is a Framework 6 RTD project, co-ordinated by the Scottish Association for Marine Science, Oban, Scotland. ECASA involves 16 research partners from 13 EU member states and is the successor to several 4th and 5th Framework Programme projects which have pushed forward our understanding of aquaculture-environment interactions.

Figure 1. ECASA study sites.

European marine aquaculture is expanding rapidly, bringing societal benefits to coastal areas where traditional employment opportunities are declining. In Scotland, it has halted rural depopulation by providing year-round employment in coastal communities. Figures released for Scottish aquaculture in 2005 show that one job in aquaculture supports an additional 2.6 in related and ancillary industries.[1] Total European aquaculture production has increased by approximately 40% in each of the last two decades. In 2002 the European Commission recognised the need to address the sustainability of this industry. The Common Fisheries Policy, which covers European aquaculture developments, recognises that the way forward to a sustainable industry is through an ecosystem-based approach, 'where the integrated management of land, water and living resources must promote the conservation and sustainable use of marine resources in an equitable way.'[2,3]

An ecosystem approach to aquaculture management is not about managing or manipulating ecosystems but is concerned with ensuring aquaculture management decisions do not adversely affect ecosystem function and productivity and so marine resource use is sustainable in the long term.

One of the main objectives of the EU strategy for sustainable aquaculture is to ensure an environmentally sound industry and develop specific criteria and guidelines for Environmental Impact Assessments of aquaculture developments. The aquaculture industry has made significant improvements in the efficiency of feed and nutrient utilisation, reducing the associated environmental pressure, but further impact mitigation can be achieved by optimal site selection. This is the focus of the ECASA project: to provide industry and regulators with tested tools and methods for assessing assimilative capacity and for predicting ecosystem effects in an environment forced by economic and climatic variability.

The objectives of the ECASA project are to:

- Identify quantitative and qualitative indicators of the effects of aquaculture on the environment and vice versa, and to assess their applicability;
- Assess and develop operational tools, including models, to establish and describe the relationship between environmental conditions and aquaculture activities over a range of ecosystems and aquaculture production systems;
- Develop effective environmental impact assessment and site selection methods for coastal area management.

To achieve these tasks the ECASA Project has been divided into six Work Packages, each addressing different aspects of the project. *(See Table 1).*

Table 1. ECASA Work Packages

Work Package	*Work Package Outline*	*Work Package Leader*
1	Coordination. Administering and managing the project. Integrating all 16 partners to ensure achievement of the projects objectives.	Dr Kenny Black
2	Identifying and quantifying the most relevant indicators of the interactions of aquaculture ecosystems.	Dr Alain Bodoy
3	Identifying and quantifying the main driving forces of ecosystem changes influencing the aquaculture sector, and developing the appropriate environmental indicators.	Dr Yannis Karakassis
4	Assessing the applicability (efficiency, cost-effectiveness, robustness, practicality, feasibility, accuracy, precision, etc) of such indicators and developing operational tools, e.g. models, establishing the functional relationship between environment and aquaculture activities.	Professor Paul Tett
5	Testing and validating these tools in order to include them in a methodology for Environmental Impact Assessment and effective site selection.	Dr Dror Angel
6	Dissemination. Organising local, regional and international meeting for stakeholders – industry, regulators and NGOs.	Mr Reinhold Fieler

Table 2. ECASA sites, species and cultivation type.

Site	Site Location	Species Cultivated	Cultivation Type
1	Norway	Salmon	Net pen
2	UK (Shetland)	Cod	Net pen
3	UK (Scotland)	Salmon	Net pen
4	France (Normandy)	Clams, Oysters	Intertidal culture: bottom and trestles
5	France (Brittany)	Oysters	Trestle and pole
6	Portugal	Clams, Oysters	Intertidal culture: bottom and trestles
7	Spain	Sea Bass, Sea Bream, Tuna	Net pens
8	Italy (Bisceglie)	Sea Bass, Sea Bream, Pandora	Net pens
9	Italy (Gulf of Venice)	Mussels	Long line
10	Slovenia	Mussels	Long line
		Sea Bass, Sea Bream	Net pens
11	Croatia	Sea Bass, Sea Bream	Net pens
		Oysters, Mussels	Long lines
12	Greece	Sea Bass, Sea Bream	Net pens
13	Greece (Crete)	Sea Bass, Sea Bream	Net pens

The indicators of the main drivers of ecosystem change have been identified and assessed, and their applicability was tested throughout Europe in the summer 2006 field campaign. Thirteen different study sites, illustrated in Figure 1, from nine European countries were involved in the ECASA field campaign, representing an array of environmental conditions and cultivated species: from the Norwegian site north of the Arctic Circle, ranging south to the Greek site located on the Isle of Crete. Both finfish and shellfish production systems were included in the study *(see Table 2)*.

The environmental models being developed are capable of examining the relationship between the environment and aquaculture activities. These models will help inform regulatory decisions on aquaculture, establish appropriate monitoring programmes and improve husbandry practices to optimise productivity in a sustainable way.

The ECASA 'Tool-Box' will contain this suite of indicators and predictive environmental models whose focus will be to aid the assessment of appropriate sites for aquaculture activities and then subsequently provide a consistent framework for the application of Environmental Impact Assessments, resulting in coherent and relevant Environmental Statements.

Aquaculture farm.

This tool-box will advise on:

- the merits of the chosen indicator set, including best methodologies for collection, analysis and interpretation
- the recommended set of models, including criteria for choice of models depending on spatial scale and farm size
- the use of models to estimate site and water body assimilative capacity and sustainable production
- the reliability of model predictions.

Interaction with industry and regulators will ensure the practical relevance of the work and that the user community achieves ownership of the project's outputs. The tool-box of indicators and models for effective Environmental Impact Assessment and site selection will be demonstrated at an international conference and workshop in September 2007. This will, for the first time, bring together regulators and industry from across Europe to consider the best methods for ensuring the sustainable development of marine aquaculture.

References

1. Scottish Executive (2005). Input-Output Tables and Multipliers for Scotland 2002. http://www.scotland.gov.uk/Topics/Statistics/14713/Multipliers2002.

2. European Commission (2002). A Strategy for the Sustainable Development of European Aquaculture. COM(2002)511.

3. Convention on Biological Diversity (2000). (UNEP/CBD/COP/5/23 Decision V/6, pp103-106). Definition of the Ecosystem Approach as adopted by the CFP.

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