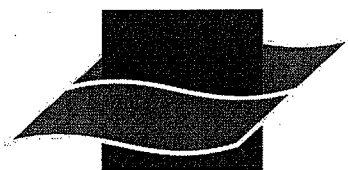

AQUACULTURE and its role in INTEGRATED COASTAL ZONE MANAGEMENT

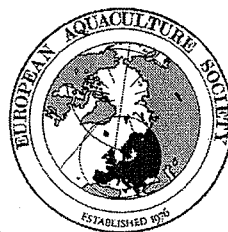
Summary Document

Oostende, Belgium

April 19-21, 2001



VLIZ
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**european
aquaculture
society**

AQUACULTURE

and its role in

**INTEGRATED COASTAL ZONE
MANAGEMENT**

Edited by

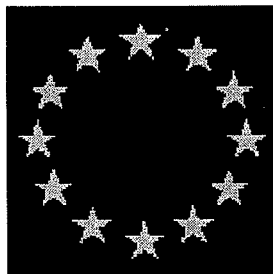
Gavin Burnell (University College of Cork, Ireland),
Philippe Gouletquer (IFREMER, Shellfish Aquaculture Research Laboratory, France)
and Selina Stead (Marine Resource Management Group, Department of Land Economy,
University of Aberdeen, UK).

A summary document of the workshop, "Aquaculture and its role in integrated Coastal Zone Management", organised by the European Aquaculture Society (EAS) & the Flanders Marine Institute (VLIZ), that aimed to examine the ways in which aquaculture can be an important and sustainable component of coastal regions.

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It does not necessarily reflect its views and in no way anticipates the Commission's future policy in this area.

Table of contents

Introduction.....	1
The Workshop Programme.....	3
Part I. Development of the EU ICZM Strategy in 2001	5
Part II. Summaries of the Workshop Sessions	9
Session 1: EU and international perspectives on aquaculture and integrated coastal zone management (ICZM).....	11
Session 2: Towards a bright future - new ideas in socio-economic and political dimensions	19
Session 3: Towards sustainable aquaculture - a shared vision?.....	23
Part III. Concluding Statement.....	27
Part IV. Events and Publications since April 2001	31

INTRODUCTION

The workshop, held in Ostende, Belgium on April 19-21 2001, adopted a multi-disciplinary approach to provide information to help producers, stakeholders, policy makers, planners, researchers and managers on wise management options for aquaculture in coastal and marine environments. The main objective was to develop stronger interdisciplinary communication between the natural and social sciences and to improve the utility of available scientific information and knowledge. A second objective was to promote new perspectives on the sustainable use of coastal areas and natural resources with means of improving collaborative coastal aquaculture research and improved production of existing and new species.

The workshop aimed to provide outputs in the form of recommendations that may lead towards proposals to be considered by policy makers. Over the 2 days, attendees were encouraged to express and discuss their views through the interactive design of the thematic sessions with leading experts from a wide range of backgrounds.

The issues were addressed under 3 main themes:

- An Introduction to Aquaculture and ICZM;
- Social, Economic, Cultural, Legal and Political Issues;
- Developing Sustainable Production Systems.

The workshop attracted 119 delegates from 21 countries. The photograph below shows some of the delegates present at the workshop.



THE WORKSHOP PROGRAMME

DAY 1. Friday April 20 2001

Opening session

- 09.00 hrs Welcome and Open Address on behalf of EAS.
- 09.10 hrs Welcome and Open Address on behalf of VLIZ.
- 09.20 hrs Welcome to the City of Oostende.
- 09.30 hrs Introducing the workshop themes and expected outcomes.
Gavin Burnell (University College of Cork, Ireland).

Session 1: EU and International Perspectives on Aquaculture and Integrated Coastal Zone Management (ICZM).

Chairperson – Gavin Burnell.

- 09.45 hrs EU perspectives on Aquaculture
Constantin Vamvakas (Head of Unit, Aquaculture, European Commission, Fisheries Directorate General).
- 10.15 hrs EU perspectives on ICZM
Peter Burbidge (Centre for Coastal Management, University of Newcastle, UK).
- 11.15 hrs Open Discussion Forum

Session 2: Towards a bright future – new ideas in socio-economic and political dimensions

Chairperson: Selina Stead

- 13.30 hrs Communicating uncertainties and values in aquaculture: policy and management issues in times of "...changing public perceptions"?
Matthias Kaiser (The National Committee for Research Ethics in Science and Technology, Oslo, Norway) and Selina Stead (Marine Resource Management Group, Department of Land Economy, University of Aberdeen, UK).
- 14.30 hrs Political and legal challenges for managing coastal aquaculture.
Hans Ackefors (Stockholm University, Sweden).
- 15.45 hrs Politics, economics and strategic alliances – promotion of European shellfish cultivation.
Doug McLeod (European Mollusc Producers Association, Belgium)

- 16.30 hrs ICZM in Europe – from demonstration to strategy.
Peter Burbridge (Centre for Coastal Management, University of Newcastle, UK).
- 17.15 hrs Open Discussion Forum
- 18.00 hrs Closure Day 1.
-

DAY 2. Saturday April 21 2001

Session 3: Towards sustainable aquaculture – a shared vision? _____

Chairperson Philippe Gouletquer.

- 09.00 hrs Aquaculture, the environment and its interaction with other aquatic resource users.
Harald Rosenthal (University of Kiel, Germany).
- 09.50 hrs Development of integrated aquaculture systems for responsible coastal zone management.
Thierry Chopin (Centre for coastal studies and aquaculture, University of New Brunswick, Canada).
- 11.00 hrs Seafood recipes: balancing aquaculture development with coastal planning.
Anamarija Frankic (Center for Coastal Resources Management, Virginia Institute for Marine Science, USA).
- 11.50 hrs Shellfish Farming and development of CZM in the Marennes Oleron Bay (Charante Maritime, France).
Philippe Gouletquer (IFREMER, Shellfish Aquaculture Research Laboratory, France).
- 12.40 hrs Open Discussion Forum
- 13.00 hrs **Closing Comments – major conclusions**
- 13.30 hrs **Closure of the Workshop**

Part I.

Development of the EU ICZM Strategy in 2001.

Over the workshop, Professor Peter Burbridge from the University of Newcastle reviewed the evolution of the ICZM process at the European level. Problems in the coastal zone originate from several sources including environmental, social & cultural and economic issues that are resulting in conflicting interests. Moreover, complex jurisdiction limits the ways in which these problems may be addressed. Therefore, a joint program was initiated by several European Commission Directorate Generals (DG), including Environment, Fisheries, and Regional Policy & Cohesion. DG research, Joint Research Center, and the European Environment Agency were partners. The program objectives were set out in COM95/511 to provide advice and technical information about sustainable management of coastal zones, and to stimulate a broad debate. This resulted in a proposal for a European strategy for ICZM.

Thirty-five demonstration projects were selected to represent key factors identified to influence ICZM success, and full range of physical, socio-economic and cultural conditions. The thematic analysis reviewed the six key factors believed to drive ICZM: legislation, information, EU policy, participation, technical solutions, and territorial & sectoral cooperation. The critical importance of the coastal area for EU economy was highlighted by several figures such as an 18 billion Euros annual benefit, and an expected annual value of net benefit reaching 8 to 13 times the invested costs. At that time, one of the critical conclusions was the fact that the sectoral approach was unable to manage the complex issues in coastal areas, therefore prompting an integrated planning and management approach to solving problems in intensively used areas.

Integrated coastal zone management (ICZM) aims to balance benefits over the long term from economic development and human use, protection, preservation and restoration of nature and living resources as well as protecting lives, property, and public access. Therefore, this approach must be multi-disciplinary and should consider both terrestrial and marine components. Meanwhile, this approach requires the policy integration and has to facilitate information transfer to all interested parties; the later issue being critical to facilitate a broad debate before producing recommendations. The EU involvement in such issues is obvious and derived from the Article 6 of the Amsterdam treaty regarding the integration of environment into other policies, and has a large legal basis for other Communities objectives. Moreover, the inter-country nature of coastal conflicts strengthens the EU involvement.

The EU contribution can focus on defining the ICZM framework, triggering ICZM at various administrative levels, stimulating ICZM development and supporting those plans by R & D funding. Although various policy options can be selected, e.g. Directive, Council Resolution, a consultation process was developed to gather ideas on that matter and resulted in an overwhelming support for EU role in terms of leadership and guidance. The overall process led to a proposal for 'EU ICZM strategy' by the Commission (September 2000 COM/2000/547), which was endorsed by the Council

(end of 2000), then adopted by the European Parliament (May 2001) for an implementation initiated in 2001 and on.

It should be noted that the Economic and Social Committee provided several recommendations in 2001 (2001/C 155/05) regarding the proposal of the European Council and Parliament:

These recommendations included: ICZM should be developed taking into account long-term changes such as climatic changes, which may affect the dynamics of coastal zones. It should be a dynamic and iterative process i.e. the process should be able to consider over its development new information pertaining to coastal zones.

Coastal process are affected by watershed activities, therefore, ICZM should take into account local peculiarities ...all of those factors should be integrated as inputs/outputs so as to establish a planning system which should be developed with a large consensus from coastal stakeholders. Although based upon environmental concerns, this system should keep social and economic aspects as a top priority. Monitoring should be concomitant to facilitate information transfer, using appropriate technologies such as satellite imaging and Geographic Information System (GIS).

All available information should be treated (including political regional development programs) so as to propose a global policy that should facilitate a sustainable environmental and economic development.

It is suggested that a central focus should be made, when developing ICZM plans, on water quality (fresh & salt) management since water is the first and initial variable affected by anthropogenic factors. Therefore, freshwater management at the watershed level should be sustainable and must be a key issue in ICZM development. Coastal and marine species are increasingly used to address human health issues, and therefore represent a genetic pool that needs to be protected for the future. The biodiversity aspect must be entirely part of ICZM development.

An ICZM plan is a political commitment, which should be followed by real actions and implementation. Therefore, the Commission should develop long-term strategies that should incorporate sustainable development policies at the economic, social, and environmental levels.

The SEC approved the development of a Management and Coordination Unit at the EU level using multiple participation from all DGs involved in the process.

It was suggested that within the ICZM action, information exchange among countries concerned by this management approach should be developed in a similar way to an 'observatory'.

Based upon those recommendations and the adoption at the European Parliament of this 2001 implementation, it has become critical to assess and discuss the role of aquaculture in an integrated coastal zone management plan.

Part II.

Summaries of the Workshop Sessions.

Session 1: EU and international perspectives on aquaculture and integrated coastal zone management (ICZM).

Chairperson: Gavin Burnell (University College Cork, Ireland)

Two communications were presented during this session, which was followed by an open discussion forum.

EU Perspectives on Aquaculture

Constantin Vamvakas (European Commission, Fisheries Directorate General).

Aquaculture constitutes an important sector of the Common Fisheries Policy (CFP). Its increasing role is mainly due to its contribution to the chronic deficit of the trade balance of the EU in fisheries products and to its economic and social importance in particular to the coastal areas of the Union.

As a new industry, aquaculture has to find its place in the management of these coastal areas; it has to reduce its negative impact on the other activities taking place in the same place but it also requests their respect concerning its own development.

EU regulations concerning CFP make reference to the need to consider the ecosystem integrity in this Policy: The Financial Instrument for Fisheries Guidance (FIFG) has, since its creation and for its first period of application (1994-1999), devoted a considerable amount of funds in order to guarantee that aquaculture development will be realised in the frame of the respect of this principle. FIFG in its current period of application (2000-2006), has increased the financial possibilities, in order to strengthen further the sustainable development of the sector.

At the same time the Demonstration Programme on Integrated Coastal Zone Management (1996-1999) permitted the Commission to prepare a Communication to the Council and the European Parliament (EP) on "Integrated Coastal Zone Management: A strategy for Europe" as well as a proposal for a EP and Council Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe.

In both documents the role of the CFP as an important stakeholder is recognised.

Finally, the Green Paper on the CFP presented by the Commission (March 2001) to the Council and to the EP, concerning its review in 2002 also refers to the sustainable and integrated management of the coastal zones. In addition, the Green Paper mentions the necessity of the application of the CFP in a coherent way with all national and local policies related to the use of coastal zones. This is relevant to coastal and marine aquaculture.

Towards a European Strategy for Integrated Coastal Zone Management (ICZM)

Peter. Burbridge (*University of Newcastle*)

The EU issued a Communication that announced a proposal to the European Parliament and Council for adoption of an EU Integrated Coastal Zone Management (ICZM) Strategy. The Strategy is intended to outline and promote what needs to be done at the national level. The Communication goes on to list what will be done at the EU level. However this doesn't mean that the local and regional levels have been forgotten - in fact the Communication notes their key role in ICZM.

The Proposed European Strategy for Integrated Coastal Zone Management (ICZM) is based on the following actions:

- Promote ICZM Activity within Member States and at the "Regional Seas" Level;
- Make EU Sectoral Legislation and Policies Compatible with ICZM;
- Promote Dialogue Between European Coastal Stakeholders;
- Develop Best Practice in ICZM;
- Support the Generation of Factual Information and Knowledge about the Coastal Zone;
- Diffuse Information and Raise Public Awareness.

ICZM Activity within Member States and at the "Regional Seas" Level would be supported through the following measures:

- A European Parliament and Council Recommendation to Member States to implement the principles of good coastal management and national ICZM Strategies;
- Support for the application of the European Spatial Development Process, including integrated planning and management of terrestrial and near-shore marine environments;
- EC support for ICZM initiatives in Member States;
- Revisions to Structural Funds and Cohesion Fund to help address coastal management issues.

Other measures to support ICZM Activity within Member States and at the "Regional Seas" Level would include:

- In addition to opportunities presented in the INTERREG III and URBAN programmes, EC will provide opportunities to implement ICZM through a proposed LIFE III programme and implementation of the European Research Area;
- Improving Links between fisheries/aquaculture and the ICZM process via new Financial Instrument for Fisheries Guidance;
- Promotion of environmental protection and sustainable development in Tourism.

Measures designed to make EU Sectoral Legislation and Policies Compatible with ICZM would include:

- Strengthening the on-going process within services of the Commission to ensure sectoral policies are compatible with and enable integrated management of the EU coastal zone;
- Commission will monitor the implementation of article 6 of the Habitats Directive;
- Promotion of short sea shipping, Strategic environmental assessment of EU Transport policy;
- Review of Common Fishery policy will provide opportunity to promote sustainable and integrated management of coastal zones and habitats.

EU Sectoral Legislation and Policies would be made more Compatible with ICZM through:

- Priority being given to adoption and implementation of the Water Framework Directive and links between terrestrial and marine management;
- Integration of ICZM principles into the ongoing revision of Bathing Water Quality Directive;
- Rural Development Policy;
- Integrating measures to tackle Marine and Land based pollution;
- Stronger measures to deal with Exotic Species introduced via Ballast Water;
- Greater emphasis on effective use of EU legislation to promote integrated territorial planning and management.

The EU would promote a stronger Dialogue between European Coastal Stakeholders through:

- Establishing a European Stakeholder Forum. EC will initiate a dialogue with other EU institutions to determine how such a Forum could be constituted and coordinated.

Measures to develop Best Practice in ICZM would include:

- EC support for creation of a coastal zone practitioners' network;
- Working toward adoption of a European Parliament and Council Decision on a Community framework to promote sustainable urban development. The coastal zone practitioners' network to be linked to networks of the Sustainable Cities and Towns Campaign.

Measures to support the generation of factual information and knowledge about the Coastal Zone would include:

- The Community Research Policy will promote research that meets coastal zone management needs;
- Update of the CORINE Land Cover 2000 project to provide information on the evolution of land-based pressures in the coastal zones across Europe;
- European Environment Agency will give special emphasis on completing the definition of indicators for the coastal zone;
- Support for multi-disciplinary learning- LEONARDO, ESF.

Measures to diffuse information and raise public awareness would include:

- Targeted diffusion of research results from 4th and 5th Research Frameworks, ELOISE, LIFE and other programmes to coastal zone planners and managers;
- Development of a Strategic Framework to improve coordination of data and information developed by agencies and through projects;
- Promote rapid ratification and implementation of Aarhus convention to ensure European stakeholders have access to factual information necessary for informed participation in ICZM.

The proposed Strategy does not aim to create a "separate" policy for coastal zones, but rather to find ways of introducing the principles of ICZM across the board into all of the relevant policies and programmes of the Community. This approach also explains why there is not a special "structural fund" or equivalent proposed for the coastal zones. The idea is to improve the design and application of all existing funding instruments.

The Commission does not intend to "do" ICZM for all of Europe. They see their role as providing leadership and guidance. The Member States need to stimulate actions at the local, regional and national level. This will cost time and money, but the study of the socio-economic benefits that can be derived from ICZM indicates that it is in the interest of the Member States to invest in ICZM as the benefits far out weigh the costs.

Discussion and Recommendations following Session One

Do good examples of best practice in ICZM exist?

The work done by the Wadden Sea project (one of the EU demonstration programmes on ICZM) is a good example where the co-ordination of activities between all of the regional authorities bordering the sea, involving three countries is facilitated – the Wadden sea is treated as one ecosystem, e.g., this is helpful in drawing up strategies to protect juvenile fish stocks. The Interregional Wadden Sea Cooperation (IRWC) complements the existing Trilateral Cooperation between the Governments of Denmark,

Germany and Netherlands, which aims to harmonize policies, laws and management measures to achieve the common purpose of sustainable use of coastal areas and resources. The different ministerial groups of the IRWC have listened to NGOs, which has resulted in some interesting initiatives, e.g., recommendations for the development of sustainable tourism arose from the consensus of different groups.

A second example can be taken from South Africa where a consensus approach to management is being adopted. Different stakeholders are brought together to share visions and to try and develop policies, some of which are now adopted – this approach only works though if a lot of people attend voluntarily.

At what level should effort be put into management?

Should effort towards management be more local, national, international or European wide? It was agreed that a multi-level approach is needed however the priorities at the various levels must remain and be taken account of. This will reflect the characteristics of an area, its people and associated industry. Detailed ecological knowledge is sometimes missing from management plans and watersheds should also be incorporated into coastal plans.

Public perception of ICZM research

Many members of the public might think that funding directed towards research on ICZM might be better spent on say developing cures for diseases such as cancer – how is the concept of ICZM going to be filtered through and sold to the general public?

ICE is one such method – stands for Information, Communication and Education. Many people will not know about the concepts behind ICZM – much of the information is written in a technical language that will be unfamiliar to the non-specialist – perhaps a video could be produced to promote the ideas and improve communication of ICZM? Perhaps a TV programme could be dedicated to this although it would be best done in a number of different languages to reach a wider international audience – other channels such as the Discovery channel could maybe do a feature on ICZM if outlined using current topical examples? Agreed that more action is needed to promote the benefits of ICZM. In terms of education, most training is given in land-use planning and few planners have been trained in ICZM – important to train more people in ICZM – future investment.

Influences of the water framework directive in coastal areas

The EU's Water Framework Directive will subsume a lot of the existing directives including the shellfish directive – the shellfish association of Great

Britain have taken legal action to ensure that the shellfish directive is included in the Water Framework Directive. What influences could some of the recommendations in the water directive have on coastal areas, e.g., what are the limitations on the 1km offshore recommendations for water quality?

Generally thought that when the Water Framework Directive was being formed it was not realised at the time the power and control that would come with the implementation of such a directive. It was also the first time that watersheds were represented and aquaculture also deserves to be protected from other forms of human use through this directive. The outcome of other research programmes such as ELOISE (European Land Ocean Interactions Studies) and knowledge of parameters such as water quality, sediments and energy fluxes are needed as a scientific basis to enrich the Water Framework Directive.

Agreed that legislation can be difficult if not thought through, e.g. some difficulties arose in the 1970s regarding the endangered species act in connection with bald eagles and the Alaskan brown bear. The eagles and bears were thought to contribute greatly to the decline of salmon in some rivers yet difficult to obtain reliable evidence especially in terms of meaningful statistics – this act is another example where legislation has not clearly been thought through.

Protecting the environment, humans and producers

It is difficult to develop management strategies that are equally effective and embraced by all those they are aimed at protecting, for example, coastal environments, humans and producers. The EC is working hard to identify best management practices that can be recommended to the Council and European Parliament. Greater collaboration between the different services has been aided by the set-up of a new unit created specifically to deal with the environment.

Integrated Planning, Development and Communication

Work has been conducted on developing ideas on multi-faceted communication including discussions on involving stakeholders. The EC and DG could benefit from the knowledge learnt from experiences in fisheries and aquaculture.

ICM (Integrated Catchment Management)

In Canada, ICM (Integrated Catchment Management) is used instead of ICZM. There have also been various initiatives such as ACAP, Atlantic Coastal Action Plans – East Coast has 14 ACAP sites – where it has been identified that there is a need to think globally but to act locally – projects

based on developing coastal action plans need to have a strong local component to them.

Eventually, it emerged from the discussion that one of the key question remains the 'consensus' - the broad support required to develop ICZM. To address that matter, it was recommended that new independent structures-organizations were required to facilitate the ICZM development and to ensure a balance of interests among users. Examples from the demonstration projects would be useful to establish such structures.

Session 2: Towards a bright future – new ideas in socio-economic and political dimensions

Chairperson: Selina Stead (University of Aberdeen, UK)

Four communications were presented during the session, which was followed by an open discussion forum.

Communicating uncertainties and values in aquaculture: policy and management issues in time of “changing public perception”

Matthias Kaiser (*The National Committee for Research Ethics in Science and Technology, Oslo, Norway*) and Selina Stead (*Marine Resource Management Group, Department of Land Economy, University of Aberdeen, UK*).

The hypothesis that forms the basis of debate for this contribution was that in order for the aquaculture industry to achieve its growth potential in terms of consumer and public acceptance then it must establish participatory fora that adopt open and transparent discussions on the current and future issues surrounding sustainable development. Fundamental to this goal is effective communication of easy-to-digest information. Also, interested parties should be given the option to be involved in the development of recommendations.

The communication recommended among others, the following measures:

- Full adoption of the Integrated Coastal Zone Management Strategy, based on a multidisciplinary framework and extended peer-reviews;
- More openness and debate, including the broadening of perspectives, regarding the issues of sustainability and food safety;
- The wider use of various participatory mechanisms on different levels, e.g. through national consensus conferences.

Political and legal challenges for managing aquaculture

Hans Ackefors (*Stockholm University, Sweden*).

Legal, institutional and regulatory framework for aquaculture development in each country are based on the water management and legal status of water bodies as well as on questions related to the inherent issues within the aquaculture technology and industry. In addition social and economic consideration govern the political attitude towards the industry. Finally, stakeholders are involved in a political process where the outcome depends on the public opinion expressed in various media. Behind this process are many international agreements. Conventions, EU-directives, communications govern the national policy in countries with regard to the environment. Recently, the EU has issued a Framework for community action in the field of water policy aiming at a more holistic and sustainable use of water with guidelines for description and analyses of the environment. FAO Code of conduct gives direction for national planning of aquaculture. Holmenkollen guidelines for aquaculture were proposed in 1994 and 1998.

At an international meeting in Bangkok in 2000, The Bangkok Declaration and Strategy were adopted. The industry itself has formed a Code of Conduct through the Federation of European Aquaculture Producers. In various countries legislation for aquaculture considers environment, water management, disease problems, health regulations, hygienic conditions and food security.

Politics, Economics and Strategic Alliances – Promotion of European Shellfish Cultivation

Douglas McLeod (*European Mollusc Producers Association, Belgium*)

Shellfish cultivation in European Union member states, totalling around 650 thousand tons in 1997, is already a significant generator of revenue and employment (approximately Euro 580 Million and more than 20,000 Full time Equivalent jobs). However, in order to ensure sustainable growth, and adaptation to the changing physical and regulatory environment in which the industry operates, most notably the implementation of ICZM, it will be necessary for the sector to pursue a greater involvement in politics, to focus attention on the economics of production and the marketplace, and to creatively engage in strategic alliances with adjacent economic, political and socio-economic interests. These promotional efforts will reflect at a national level the scale of the industry, the different extent of ecological 'footprint' of the industry, political interaction, and economic engineering, as well as each individual state's progress with the implementation of ICZM. But the optimum approach in terms of effectiveness and productivity is predicted to occur at the pan-European level, through mutually beneficial alliances negotiated between the officially recognised professional organisations at the Community level. Such a response will safeguard and promote the future prosperity of the industry. The alternative 'Business as usual' scenario to a positive response to the challenge of ICZM is an industry condemned to decline, under siege from more aware and protective competitive users of the coastal zones resources.

Discussion and Recommendations following Session Two

Public Image of Aquaculture

The general public distrust scientists, politicians and fish farmers, so who can help inform them about aquaculture? The suggestion was that we should be getting environmental organisations, animal welfare groups and the media on our side. There are also reputable organisations like independent parliamentary bodies, science ethics committees, science museums etc, which are distant from the industry and could be useful vehicles for educating the public. Aqua-media is an initiative that has been set up by FEAP to address this issue. Please see <http://www.aquamedia.org>

Local consultation

In order to settle issues involving aquaculture a consensual approach (bottom up - top down) involving local stakeholders is recommended, however care must be taken that aquaculture is one of the stakeholders at the table!

In other word some measure of control is necessary in order to keep the planning process on track.

Coastal fora

We must recognise and nurture the various biomes which support coastal production e.g. we must conserve the mangroves, as well as the fish and shellfish which grow in or near them. This entails recognising a coastal ecosystem approach.

The problem with scientists...

Scientists and the public do not relate to each other. One of the problems is that scientists do not get recognition for non peer - reviewed articles and therefore tend to concentrate on improving their publication record in scientific journals. We need more vulgarisation of aquaculture through television, radio and magazines promoting "fish as food" - after all, aquaculture is a part of the food chain, not just a primary producer.

There are 4 components of the seafood business (capture fisheries, fishery based culture, culture based fisheries and pure culture) and we should all be pulling together to improve our market against other generic products like chicken and beef.

For 25 years EAS has successfully communicated with and educated the scientific community and is now trying to get technical information across to producers. However nothing has yet been done to inform and educate the general public. The aquaculture industry needs to fund and promote its own positive fish stories.

With the new ICZM status and more conflicting interests, it appears now that EAS should broaden its approach by defining a new objective to communicate to the public, as a larger audience.

Risk management

Up until now coastal risk management has mainly been concerned with flood control, and oil spills. Aquaculture must now be included in a holistic approach to this important topic. In the absence of information about the environmental impacts of aquaculture, the precautionary principle will always be applied.

Site assessment

How do we decide what activity goes where?

Concepts such as carrying capacity, sustainability, ecological footprint etc all need to be considered. Because of the high populations living on or near EU coastline aquaculture will have to share with other users. It will therefore have to form strategic alliances with stakeholders having allied interests e.g. conservation groups, tourism etc. Aquaculture also needs to make sure that all sectors within it are singing off the same hymn sheet. If we don't hang together we will hang separately!

EU Action

The EU has compiled a list of Directives and Regulations pertaining to aquaculture. The web address for all ICZM documents is <http://europa.eu.int/comm/environment/iczm/home.htm>

Session 3: Towards sustainable aquaculture – a shared vision?

Chairperson: Philippe Gouletquer (IFREMER, France)

Four communications were presented during the session, which was followed by an open discussion forum.

Aquaculture, the environment and its interaction with other aquatic users.

Harald Rosenthal (University of Kiel, Germany).

A historical review of the aquaculture technics and efforts to limit environmental impacts was presented. As early as 1993, a meeting focused on how to reduce fish farm effluents. This led eventually to a European program MARAQUA, so as to develop a monitoring of marine aquaculture. Large significant improvements can be highlighted: in 1987, a 87 000 tonne production was responsible for a 50T nitrogen release, while in 1994 and 1999, 280KT and 400KT resulted in a 1 ton and 390Kg nitrogen release respectively. This clearly demonstrated the improvements as well as the efforts carried out by the aquaculture to limit side-effects. However, there are still persisting problems such as the disease issue, interactions between farmed populations and wildlife, and the issues of escapees, introduction of exotic species which has dramatically increased by the ballast waters resulting from international trade.

Development of integrated aquaculture systems for responsible coastal zone management.

Thierry Chopin (Centre for coastal studies and aquaculture, University of New Brunswick, Canada).

This presentation demonstrated that one of the principal difficulties for resource managers was the assessment of the assimilative capacity of coastal ecosystems while under cumulative pressure from anthropogenic factors.

The monitoring program presented here has demonstrated that seaweeds can be considered as appropriate bio-indicators of the nutrification/eutrophication process. As nutrient time integrators, seaweeds can also be a useful indicator of aquaculture impact when grown in or near proximity to fish farms, especially with regard to inorganic outputs from the farming activity.

Sustainable aquaculture can be achieved by integrating various and complementary species. For example, since seaweeds are efficient nutrient absorbers, their culture can be considered as an approach to limit nutrient release into the environment from the fish farm, while using these 'extra' nutrients for better growth themselves. Not only does this give rise to mutual benefits for co-cultured organisms, but it also reduces the economic risk to the producer through economic diversification and results in a more

sustainable and balanced activity. Targeted species such as *Porphyra* (which requires constant availability of nutrients especially in summer) are being grown within salmon farms in Canada and USA and are currently under evaluation to test this hypothesis.

Although innovative, this kind of approach still requires more research and development, particularly in the following fields:

- Improvements of cultivation methodologies and transfer to new environments;
- Development of native species rather than exotic ones;
- Improving modelling capacity to maximize the balance between co-cultured organisms and
- A legislative framework to facilitate this approach.

Seafood recipes: balancing aquaculture development with coastal planning.

Anamarija Frankic (*Center for Coastal Resources Management, Virginia Institute for Marine Science, USA*).

One of the key issues concerning aquaculture development is the availability of efficient tools for coastal zone planning. Few empirical studies have demonstrated how coastal zone management could be implemented, while facilitating aquaculture development.

A case study was presented, focusing on a generic framework for comprehensive planning that includes environmental, social and economic considerations on Cres Island in the Croatian coastal zone.

Although a comprehensive database is required for such development (including biological, social and economic criteria), this approach, based upon a conflict matrix, facilitated the site selection process and a protocol for sustainable aquaculture. Both G.I.S geographic information systems and remote sensing technology were used to define a geographic framework, specify environmental constraints and identify resources limitations. This approach is particularly useful for limiting spatial conflicts and for facilitating the decision making process for coastal planners.

Shellfish farming and development of CZM in the Marennes Oléron and Charentais Sound.

Philippe Gouletquer (*IFREMER, Shellfish Aquaculture Research Laboratory, France*).

Although shellfish farming is a traditional activity that has been practiced for more than 100 years in France, the industry has recently seen numerous conflicts emerging from spatial conflicts and / or use of natural resources. These include the management of freshwater inputs into the coastal areas, impacted at the watershed level by agriculture (qualitative approach) and

mostly by irrigation activity (quantitative approach). These conflicts may in specific areas affect the overall sustainability and economic yield.

The case study of the Charentais sounds and the Bay of Marennes Oléron was presented as one of the leading European areas for shellfish production. To reverse the economic trend, the shellfish industry has adopted several initiatives including the optimisation and restructuring of the traditional grounds, as well as testing new techniques in new areas. This has led to conflicts with other coastal users, mainly in fishing activities and in tourism). External constraints are also emerging such as new and increasing regulations.

The development of coastal activities has resulted in highly complex situations, where management attempts have only been partly successful. The main reason for the lack of success in this development is seen as being due to diverging interests and lack of cooperation. Multidisciplinary research has reacted to these difficulties by merging biological and ecosystems research studies with technical and social programs at the early conceptual stage. This approach is considered as a key issue for addressing ICZM development.

Discussion and Recommendations following Session Three

Integration

The preliminary step towards sustainable aquaculture is to develop integrated aquaculture systems. Promoting these developments would limit potential side effects and optimize coastal use. This could be considered as a responsible answer from the aquaculturists to public and/or environmentalists' concerns as well as to other coastal users. Moreover, this represents a development margin for aquaculture projects. Similarly, in-shore development by using integrated and closed systems would also be a way to decrease the coastal pressure.

Ballast waters – an underestimated global threat!

Aquaculture should be considered as a key player in the coastal management plan development, which should be carried out using a holistic approach. In several cases, aquaculture activity can be considered as an environmental sentinel since the marketability of its production is highly dependent upon the environmental quality. This emphasizes the need for increased exchanges with environmentalists and other coastal users. Therefore, common goals exist!

As an example, the danger associated with ballast waters was highlighted by aquacultural activity while it can be considered as a major ecological threat with regards to biodiversity. In contrast, the aquaculture industry is aware of possible impacts resulting from its activity and has already addressed several issues. Nutrition and food composition for intensive aquaculture has dramatically improved, therefore limiting environmental impacts as well as

pressure on other marine species. This concern is still a major issue for the industry in its sustainability goals.

Spatial conflicts

Coastal use is increasing, therefore leading to increased spatial conflicts. Similarly, interactions between coastal environments and watershed development are becoming increasingly significant. Technical improvements by using Geographic Information System (GIS) & remote sensing operations represent a major step to facilitate decision-making and optimize coastal uses. It may represent one way to 1) limit spatial conflict by allocating space in countries with emerging aquaculture, and 2) develop platforms and improved understanding and perceptions among users in instances of strong overlap in activity.

Meanwhile, we can recognize that social sciences are critical to facilitate cooperation and better understanding when developing aquaculture projects within integrated coastal management plans.

Part III.

Concluding statement.

New perspectives on the sustainable use of coastal areas and natural resources with means of improving collaborative coastal aquaculture research and improved production of existing and new species were discussed. Within the aquaculture industry, approaches such as integrated systems can be promoted as a way to limit impacts and conflicting uses of resources.

Developing stronger interdisciplinary communication between the natural and social sciences and improving the utility of available scientific information and knowledge, was one of the major objectives reached by the workshop. Attendees from 21 countries specialised in various sciences presented a comprehensive view of aquaculture development with the ICZM emerging needs. A broad consensus can be reported on a strong participation of the aquaculture industry into new and independent structures that are requested to balance interests among coastal users, including preservation of the environment.

This would imply that organisations involved in aquaculture, such as the European Aquaculture Society, need to adapt their communication strategy, initially developed to improve communication among aquaculturists, to a broader public. This is also a way to improve relationships between the industry and the social demands. This will facilitate a broader debate and discussion among users and will facilitate the emergence of useful cooperative research programs between social and life sciences.

It is important that the all those with an interest in aquaculture and coastal and marine environments remain proactive and develop holistic approaches to sustainable management. EAS will continue to promote this through its activities.

Part IV.

Events and Publications since April 2001.

Conference:

People and the Sea: Maritime Research in Social Sciences: an agenda for the 21st Century. August 30- September 2, 2001. MARE – Center for Maritime Research Organization

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