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A perspective on environmental management for aquaculture

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SUMMARY – Marine aquaculture in the Mediterranean is an expanding activity that is beginning to have an important role in industry, contributing a large percentage to total production of seafood. Most Mediterranean installations are coastal, being nowadays one more user of our coastal zones, which have been classified repeatedly as an extremely important natural resource. Coastal areas have many other uses (tourism, defense, navigation, fishing, and, of course, environmental preservation and conservation) and their management should be organized in order to avoid conflicts between them. It is reprehensible that, years after the idea of integrated coastal zone management was formulated theoretically, Mediterranean countries inside and outside the European Community still have not put the concept into practice. In practice, due to the lack of planning by competent authorities and the lack of social dialogue and consensus, conflicts between aquaculture and other coastal uses are beginning to appear. Nations must develop instruments for integrated coastal zone management in which aquaculture occupies a place without detriment to other coastal zone uses. The relevance of this activity should be assigned in accordance with political priorities and international agreements. Once the basis for industrial aquacultural development is consolidated, a series of specific measures should be adopted in three areas in order to conserve regional uniformity in the Mediterranean, the focus of which would be: (i) regulatory or legislative measures; (ii) economic measures (service fees, financial aids and incentives, and market creation); and (iii) administrative measures.

Key words: Coastal zone management, aquaculture, planning.

RESUME – *"Une perspective sur la gestion environnementale pour l'aquaculture". L'aquaculture marine en Méditerranée est une activité en expansion qui commence à jouer un rôle important dans l'industrie, et contribue pour une grande part à la production totale d'aliments de la mer. La plupart des installations méditerranéennes sont côtières, et sont actuellement un utilisateur de plus de nos zones littorales, qui ont été classées à plusieurs reprises comme une ressource naturelle extrêmement importante. Les zones littorales font l'objet d'un grand nombre d'autres usages (tourisme, défense, navigation, pêche, et, bien entendu, préservation et conservation environnementale) et leur gestion devrait être organisée afin d'éviter des conflits entre ceux-ci. Il est répréhensible que, des années après que l'idée de gestion intégrée des zones littorales ait été formulée théoriquement, les pays méditerranéens membres et hors Communauté Européenne n'aient pas encore mis le concept en application. Dans la pratique, dû au manque de planification des autorités compétentes et au manque de dialogue social et de consensus, des conflits commencent à apparaître entre l'aquaculture et les autres usages du littoral. Les nations doivent mettre au point des instruments pour une gestion intégrée des zones littorales où l'aquaculture occupe sa place sans que ce soit au détriment des autres usages des zones littorales. L'importance de cette activité devrait être établie en rapport avec les priorités politiques et les accords internationaux. Une fois que l'on aura consolidé la base pour un développement aquacole industriel, une série de mesures spécifiques devraient être adoptées dans trois domaines afin de conserver l'uniformité régionale en Méditerranée, articulée autour de : (i) mesures réglementaires ou législatives ; (ii) mesures économiques (tarifs des services, aides financières et incitations, et création de marchés) ; et (iii) mesures administratives.*

Mots-clés : Gestion des zones littorales, aquaculture, planification.

Introduction

Marine aquaculture in the Mediterranean is an expanding activity that is beginning to have an important role in industry, contributing a large percentage to total production of sea fish, shellfish, and crustaceans. Aquaculture facilities are generally developed in poorer coastal areas that either lack infrastructure or have deficient infrastructure, and usually receive public aid and investments.

Most Mediterranean installations are coastal, open-sea fish farms still being rare. Coastal zones have been classified repeatedly as an extremely important natural resource. This value of coastal zones has been implicitly recognized by political and legal instruments that attempt to guarantee the adequacy of coastal planning before making any legitimate concessions for use. In the case of Spain,

for example, the coast is a *public maritime-land domain*. According to the Constitution and 1988 Coastal Act, this means that the coast is at the service of general interests and cannot be subject to appropriation or private use. Public authorities must guarantee that the coast will be an object of "*rational use compatible with its nature and purposes, respectful of the landscape and natural environment*".

Coastal areas have many uses and their management should be organized in order to avoid conflicts between these uses. Tourism, defense, port uses, fishing, and, of course, environmental preservation and conservation must remain compatible with aquaculture installations without raising unnecessary obstacles or damaging coastal resources, which are the origin of all these and other activities.

However, in practice, due to the lack of planning by competent authorities and the lack of social dialog and consensus, conflicts between aquaculture and other coastal uses are beginning to appear: in some areas water pollution is affecting the interests of producers. Fishermen claim that their livelihood is being affected by damage to posidonia pastures on the seabed, which are fundamental for the reproduction and survival of the marine species they capture. Documentation is appearing that attributes this damage to residues generated by cages for marine culture. Eutrophication and the modification of coastal habitats of ornithological interest throughout the Mediterranean also have been mentioned as possible consequences of marine aquaculture. The active presence of biotechnology, in the form of transgenic feed for fish or the breeding of genetically modified species, may soon become very important, and with it, the risk of genetic contamination.

It is reprehensible that, years after the idea of integrated coastal zone management was formulated theoretically, Mediterranean countries inside and outside of the European Community have still not put the concept into practice. Government neglect of their responsibilities is holding back the development of the aquaculture sector, deteriorating coastal regions, poisoning social debate and, consequently, damaging the image of this activity because it cannot be developed or focused technologically, nor can its impact be evaluated if there is no consensus regarding effective planning instruments.

Integrated coastal zone management

Background

For years, international organizations of every type, including the UNEP, European Council and OECD, have insisted that an integrated and protective strategy for coastlands was needed. Agenda 21, adopted at the 1992 Rio Summit, also called for such measures.

In the EU, this demand developed and extended from an earlier date, 1981, when the "Conference on Peripheral Maritime Regions" of the EEC approved the European Coastal Charter, which was followed by a series of resolutions by member states. In spite of these calls to action, no common strategy was agreed upon until March 1994. This process culminated in the communication by the Commission to the EU Council on Integrated Coastal Zone Management of 29 November 1995 [COM(95)511 final/2].

Concept of integrated coastal zone management

Numerous policies and legislation in Europe affect coastlands, particularly in the European Community. However, even here legislation directly addressing coastal areas is scarce. Generally, coastal protection and management derive from the application of different sectorial instruments. Local authorities usually are responsible for planning in coastal zones.

At the same time, many community instruments affect coastal zones, including instruments derived from agricultural, regional, and cohesion policies and their respective financial instruments, but the scant mechanisms of coordination that have been designed have not yet been effective in practice.

Current European coastal policy has been categorized by the European Council of Municipalities and Regions as: "*based on fragmentary knowledge, involving uncritically formulated proposals, poorly integrated with environmental policy, potentially destructive, and inappropriately financed*".

This situation has prompted the European Community to assume international criteria for so-called "integrated coastal zone management". It is understood that this concept, at the very least, should include *a set of policies designed and applied in a coordinated way as well as an increase in available information*. In order to give the concept substance, the OECD has recommended a series of political measures for each country that should be agreed upon within the guidelines of international coordination. These measures imply that *institutional integration mechanisms* should be established to coordinate lines of management between different responsible authorities. Their role should be:

(i) To contribute to decision-making by generating and distributing adequate information. This implies the development of alternative management options for each use, strategic evaluation of plans, and permanent surveillance and follow-up of their application.

(ii) Information and data banks of available scientific information as a resource for all policies formulated. At present, this would require improving information about the impact of human society on natural coastal systems. Briefly, the necessary data would include: analyses of natural systems and resource use, analyses of the impact and evolution of natural resource use, and the economic impact of development in coastal zones.

(iii) Financial support for long-term implementation of the above measures.

At an institutional level, Birdlife International has suggested that a secretariat be established in the EU Commission and capacitated for promoting coastal zone management in Europe and the member states. The main proposal of the European Office of the Ecologist Movement (EOEM) is that unified urban planning criteria be established. A proposal to this effect has been made by the EOEM and Birdlife, and contains the following key points:

(i) National objectives to be met by coastal zone management should be established, which entails:

- Creation of mechanisms integrating coastal zone management with the work of the Directorates-General of the Commission.
- Strengthening of systems of public participation.
- Establishment of mechanisms for facilitating the exchange of information between member states.
- Development of data banks and specific indicators.

(ii) Development and experimentation with procedures and models that can be followed up.

(iii) Establishment of a calendar for compliance and permanent evaluation of activities.

Coastal protection also is a priority for the agreement that established a framework of activities over several years (1994-1999) for the European Environment Bureau (EEB), a framework that has already disclosed a number of points that should be resolved before a true coastal zone strategy can be implemented. For example, the development of coastal zone management may require an EU approach to land management questions, something that until now has always been in the hands of member states.

The principle of environmental integration in planning

Coastal zones are a key point in the V Community Framework Programme for the Environment, which established a framework for the Community environmental policy to be in effect until the end of the year 2000. The V Programme favored integrated coastal zone management through the achievement of four key objectives:

(i) Improved coordination at every level.

(ii) Development of an operative framework for integrated planning and management.

(iii) Development of criteria for achieving a better balance between land use, coastal zone conservation, and the use of natural resources in coastal zones.

(iv) Establishment of public education and participation mechanisms.

The V Programme also introduced the concept of *shared responsibility* and the active involvement of economic and social agents. This concept should be combined with the idea of *subsidiarity*, which, for a given objective, entails that action be adopted at the EU, national, regional, or local level depending on the foreseeable range of its effects, with preference on local action whenever possible.

In the light of these two concepts, community strategy would be to promote an approach to common European objectives that have transnational effects, such as the protection of migratory species, control of urban planning, and levels of environmental protection, as well as integrated processes for decision-making and defining local objectives.

In addition, the V Programme insists particularly on the *principle of environmental integration*, which means that environmental questions must be a component of other policies and never isolated targets of action. In the legislative area, the need for integration and coordination is particularly noteworthy. Some directives influence coastal zones. For example, the field of nature conservation includes directives 79/409, for the protection of birds, and 92/43, for the protection of habitats. These standards oblige member states to designate sites for the protection of habitats and species of European interest, many of which are located in coastal zones. The conservation objectives of these standards cannot be achieved without integrated planning.

One of the few serious attempts made was the preparation of Strategies for the Conservation of Biodiversity, an aspect of conservation often at risk of being overlooked by traditional planning instruments. In order to satisfy the obligations that derive from the United Nations Convention on Biodiversity (1992), the EU Commission published a communication titled "Community Strategy for Biodiversity". The stated objective of this strategy is to anticipate, prevent, and address the causes of the reduction of biological diversity at their sources.

The urgency of integrated and integrative environmental planning is illustrated by the processes and effects unleashed by aquaculture in coastal zones. Table 1 shows routine considerations on this respect.

Table 1. Processes and effects unleashed by aquaculture in coastal zones

Processes	Effects
- Seabed transformation	- Local and regional disappearance of species
- Water pollution	- Fragmentation, modification, and destruction of species and habitats
- Introduction of exotic species, genomes, and pathogens into natural environments	- Loss of genetic diversity

These three effects are phenomena that affect to some extent other uses of coastal zones. To confront these effects successfully, it is necessary to consider the enormous need for research, training, and improved evaluation techniques. However, research cannot be targeted effectively and evaluation makes little sense if countries are not equipped beforehand with instruments for integrated planning and management of coastal zones.

Conclusion

Nations must develop instruments for integrated coastal zone management in which aquaculture occupies a place without detriment to other coastal zone uses. The relevance of this activity should be assigned in accordance with political priorities and international agreements. Therefore, planning would result from the previous organization of coastal uses and development of maps of resources and areas to be conserved under the auspices of conventions for the protection of the Mediterranean and Community directives for protection of the natural environment.

Once the basis for industrial aquacultural development is consolidated, a series of specific measures should be adopted in three areas in order to conserve regional uniformity in the Mediterranean, the focus of which would be:

(i) *Regulatory or legislative measures*, or "institutional measures designed to influence directly the attitudes of those who can cause resource deterioration, by regulating procedures and products used in these activities".

(ii) *Economic measures* or "voluntary actions that use financial incentives and involve public powers in order to maintain or improve environmental quality". These measures can be classified as:

- Service fees (for landfills, services, activities, production, administrative contributions).
- Financial aid (grants, low-interest loans, tax breaks).
- Market creation (exchange of rights, market interventions, insurance).
- Financial incentives.

(iii) *Administrative measures*. Coordination of organizations responsible for, or involved in, coastal zone management (for example, the creation of networking groups between national ministries responsible for coastal zones, interministerial commissions, sectorial study groups, etc.), promotion of mechanisms of intersectorial integration at every level of government. Preparation of a general coastal zone strategy that is locally applicable through detailed measures and voluntary agreements with agents acting on coastal zones, which would make it possible to achieve the following results:

- Strengthening of environmental safeguards, particularly impact evaluation.
- Inclusion of the concept of sustainability in the allocation of public funds and project development, particularly by the correct economic and social assessment of aquaculture.
- Promotion of Codes of Good Aquacultural Practices.
- Establishment of stable systems for evaluating the environmental and social impact of aquaculture.
- Professional training, establishment of networks of business people and workers, and the initiation of mechanisms for exchanging experiences.
- Establishment of compatible objectives for nature conservation (i.e., in the European Community the inclusion of areas in the future Natura 2000 network, in compliance with the stipulations of Habitat Directive 92/43).

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