SUSTAINABLE AQUACULTURE INDICATORS FOR THE MEDITERRANEAN SEA

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Indicators are identified in order to conduct an assessment on the Mediterranean aquaculture. This assessment is based on a number of indicators covering the environmental, economic and social dimensions of aquaculture. The group of indicators has been selected based on a set of criteria independent of area, species and time, so that they can have a wide application now and in the future.

The selected indicators are divided in three lines orientated to farmers, countries and the whole Mediterranean region. Each line has environmental, social and economic indicators. Information on all indicators is easy to obtain and measure. The selection of indicators has been agreed by a group of experts during two workshops.

These indicators could guide the expansion of aquaculture today and in the future, helping to avoid mismanagement and improving governance. There are a number of options for the industry to ensure it is sustainable over the long-term, including the implementation of best management practices and the adoption of the use of indicators like the ones proposed in this paper.

Introduction

With the increasing demand for seafood in Europe and the declining return from wild fisheries, aquaculture is seen as the industry that will meet this gap in the future. The FAO foresees an increase of the aquaculture production in the coming years, but with limitations (FAO, 2008). We need to consider the following: What would be the environmental implications of such an expansion? Are farmers and policy makers prepared for long-term sustainable development? How can we prepare them?

The 1987 World Commission on Environment and Development (The Brundtland Commission) popularized the idea of sustainable development with a report that called for meeting the needs of the present generation without compromising the needs of future generations. A sustainable system or process must be based on resources that will not be exhausted over a reasonable period ('long term'). Therefore, sustainable aquaculture is the aquaculture that provides animal protein for human consumption indefinitely, is based on good practices, uses resources in a responsible manner, does not have irreversible or significant impact on the surrounding environment, and promotes social development and economic growth (CONSENSUS NGO's consultation). Finding the appropriate indicators to assess the health state of the Mediterranean aquaculture will help consumers, markets, policy makers and farmers benefit from natural resources today and tomorrow. Indicators are tools that can help us analyse the complex world we live in. They quantify and simplify information about issues that are often derived from technical research, are dependent of intention, and are open to any interpretation (UNEP, 2003).

Competition of aquaculture in the Mediterranean with other coastal industries, such as tourism, is becoming a major problem for development and expansion. Society has a misconceived image of this activity based on the belief it is a pollutant. Economic, social and environmental are issues among the most important for sustainable aquaculture success and must be carried out in accordance with best practice guidelines. For this reasons it is imperative that a set of indicators is developed and implemented to assess the sustainability of aquaculture.

Methods

There are many approaches to assessing the sector's and other stakeholders' sustainability. This study has chosen the indicator approach which is often much simpler to apply, it is easier for policy makers and society to understand how the indicators reflect changes in the system, and the significance of those changes in the value of the indicators.

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The indicator survey approach is based on the following assumptions: expert opinion is a valid input and a consensus of several experts is better than the opinion of a single expert. In its standard form, the survey process involves two workshops. The panel of expert stakeholders in this study consisted of aquaculture producers, researchers, regulatory authorities and international organisations (IUCN, FAO). All the experts have recognized experience and the know-how of previous studies or projects related to the present one.

Indicators were selected based on a detailed framework to capture the environmental, social and economic dimensions of the aquaculture sector. The final group of indicators also met the "SMART" criteria: specific, measurable, achievable, relevant and time-bound (GEF, 2005).

Results

Two classifications of the indicators were made. The first one focused on the identification and research of specific indicators for: 1) *Farms and producers*: as main concerned parties for the direct effect of their industries' footprints; 2) *Countries and governments*: as policy makers for the institutional framework allowing and facilitating bureaucracy routes for farmers; 3) *Mediterranean region*: promoting regional networks and the necessary understanding of the principle "act locally, think globally". Each level has quantitative indicators using a ranking that led us to a final score; likewise a number of improvements easy to implement in the short-term will benefit the sustainable state for each sector. This way a balance between those three stakeholders can be achieved.

A second classification refers to the characteristics and dimension of the selected indicators. Sustainable production systems do not only consider environmental aspects of the production process, but also their economic and social aspects, especially in the case of "fair trade". When a balance between all of them is acquired sustainability can be achieved. Therefore, the following dimensions are defined: 1) *Environmental:* showing possible environmental interactions on flora, fauna, landscape, biodiversity, marine sediment; 2) *Social*: showing interactions between the industry and employees related to working conditions, risks or consumption prices, and between all stakeholders that have to share same zones; 3) *Economic:* showing input and output processes and governance, reflected in those entries that mean significant expenses or establishing improvements in their management in the long-term.

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