IS THERE A NEED FOR NEW MODELS FOR OCEAN MANAGEMENT?

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ABSTRACT

World fisheries are characterized by ecological, economic and social costs which are not taken into account by current market mechanisms. However the sustainability of ecosystems and fishing activities depends on their taking into account in order to take the most suitable management decisions. Based on the consilience concept, the European research program in co-operation ECOST develops an integrative approach of the various costs generated by fishing activities as well as public policies. This model is suitable for helping decision-makers to realise the Johannesburg Plan of Implementation.

Keywords: ECOST; ecosystem; consilience; societal costs; fishery; ocean

INTRODUCTION: MISSING MARKETS

The market economy society, the majority of goods and services are affected by a price. This price is used as a signal to producers and consumers and allows them to adjust their behaviour. It is an indicator of relative scarcity under conditions of current and anticipated supply and demand. The resources offered by oceans and nature in general are out of the market: fauna and wild flora, water, air, ecosystems, etc. They don't have any visible value indicator. Without a price indicating the importance of the sacrifices made in order to obtain or conserve them, economics agents have the tendency to consider that the price is zero. There are innumerable cases where natural assets have been sacrificed because of the non-integration of their intrinsic value into economic calculations. The absence of price for certain type of goods and services is mainly due to the fact that 1-they are shared in common and are de facto indivisible (their individual appropriation is not possible; 2-they don't have any direct production cost (they have been built without human intervention); 3-they are submitted to a high level of externalities: someone's uses affect other peoples' uses of the same or different goods or services. All these aspects explain why a market for such resources has not been developed yet and why a collective action based on scarcity indicators and missing exchange values is difficult to implement.

If economists insist on the necessity of putting a price on natural assets, philosophers remind them that behind this attempt one should look at the human perceptions regarding nature. If A. Sen [1] has restored an ethical dimension to economics, S. Collet [2, 3], R. Larrère [4] and C. Larrère [5] have pointed out the necessity to go a step further by analysing our relationship with nature firstly by setting aside the usual dualism between human kind and nature or the intrinsic value of nature approach, and secondly by redefining the interactive relationship between humans and nature with the notion of ecocentrism. So, the choices we make regarding how to utilize natural systems have fundamental implications for their maintenance, and ultimately therefore for the sustainability of the services they provide humans. That is why ethics is a key issue in marine natural resources management. To some extent, the way fisheries are evolving is defined primarily by the perception of fishermen, decision-makers, scientists and society and secondly by the results of the application of economic and ecological models applied.

CHOICE OF MODELS

The choice of the model is fundamental for the management of natural resources. Until now, the main models used have been neo-classical models (initially developed by Gordon-Schaefer, later extended by Clark, Munro, Bjørndal and others, input/output matrices, cost/profit analysis). They are usually used to measure the economic effects of fishing activities in reference to the stock level and capacities. The advantage of these models resides in the transparent nature of the mechanical procedure used, thus making it possible to reproduce them once a certain amount of basic data has been collected. These models are widely used for analysis in Europe and throughout the world and although they have proved themselves by the simplicity of their use, they have also shown their limitations, particularly concerning their inability to give a complete picture of the impact of fishing activities: accounts of their effect on the natural environment are either omitted completely or considered solely in terms of the species targeted by the fishery and so the effects on the ecosystem are never taken into account; consideration of the economic and social effects is limited to the creation of jobs, added value, and public revenue, but does not include the costs supported by the civil society for the management or restoration of damaged ecosystems [6]. The primary role of current models is therefore to consider the private profit involved without taking into account the costs borne by society and the ecosystems themselves.

New types of models have been emerging since the beginning of the 1990s, namely ecosystem models and integrated models (ie ecology-economy). Ecosystem scientists consider that a comprehensive understanding of the structure, function, and regulation of major ecosystems is necessary to face the world's ever-growing environmental problems [7-9]. Mass-balance biomass models (Ecopath approach, inverse methods) are being used globally as an efficient and useful method to systematically describe ecosystems and to explore their properties [10-12]. They constitute a simple approach to representing the complexity of an ecosystem, and they involve a mass-balance description of trophic interactions between all the functional groups of the ecosystem. Such scientific tools provide valuable information on the health of marine habitats, as well as the capacity to support biological production and sustainable development of coastal country marine waters.

Integrated models have been developed since the beginning of the 90s in order to integrate economics, biology and ecology. Scientists use mainly two ways to achieve linkages between them: the first one is an extension of the original model toward the other spheres in order to integrate “foreign components”; the second one is through interdisciplinary work where each discipline brings its own components into a commonly designed framework. For instance, ecologists use what are termed ecology-cum-economic models and rely on the use of system dynamics to formulate and solve their models. They are primarily interested in investigating how the ecological system behaves under a specified set of policy instruments. Economists, on the other hands, use economic-cum-ecology models, and are interested in deriving optimal policy responses to a specific system. They have been diligent in modeling robust dynamic economic systems, but have been as guilty as the ecologists in being less attentive to capturing the dynamics of the “other” system. Integration is possible because of the predominant use of mathematics in economics and ecology: mathematical presentation of the models to analyse and study behavioural relationships is common to both disciplines and therefore sets a conducive environment for integration. Consilience principle can also act as cement between disciplines by linking facts and fact-based theories across disciplines to create a common groundwork [13]. Nevertheless, and despite the impressive recent development of computer technology, integrative models are only localized within the climate change community. Natural and marine resources management models are still design according to the accepted norm.

As regards human exploitation, ecological assets represent public goods and the consequent externalities associated with their use are not usually well accounted for in market mechanisms. The essence of the notion of societal cost is to capture these externalities and slipover effects that last longer than the lifetime of marine resources. The societal cost is not yet known in the scientific literature. It is only mentioned in the field of sociology in order to address issues at the society level [14, 15]. Basically, it relates to three concepts: 1- “total economic value” which consists in measuring the monetary and non-monetary values of the services rendered by the environment (actual use value), of services that it may potentially be able to render in the future (optional value) and the value of the existence of the former (existence value) [16]; 2-“marginal cost of replacement” which is the cost that would be associated to replace the services currently provide by a piece of nature [17]; 3-the function value of species in an ecosystem and the function of one particular ecosystem in a wider ecosystem [11]. Thus, the societal cost can be interpreted as a shared concept between ecology, economics and sociology.

THE SOCIETAL COST CONCEPT

The societal cost concept can be fruitful to analyse and help to address some common issues that West African, South-East Asian and the Great Antilles fisheries are facing: 1-the surplus capacity of the fishing fleets operating in national and international waters [18]; 2-the loss of biodiversity and biomasses [19] over the last 50 years; 3-the increase of poverty in fishing communities and the augmentation of the external debt of the coastal countries [20-23]; 4-the utilization of some fishing management practices to try to solve the problem of over fishing: raising the cost of fishing activities and erecting barriers to entry into the fishery. Instead of leading to a more efficient system of production that can cope with the natural variability of resources and ecosystems, these management methods have contributed to an increase of fishing costs and to an inflexible system of production that needs to be maintained by subsidies [24]. The dimension of the fishery problem can no longer be confined to a local level. As Kurien [25] pointed out, "the macro trend of globalisation and the counteracting micro trend of localisation in many 'tropical-majority' world countries give rise to the need for new approaches to governance at both level". The triple cross-level interactions (horizontally from the ecosystem to the society, vertically form the local to the global and temporally form the present to future generations) require the invention of new tools and methods to define the efficiency of marine resources policies. The international willingness to move from the single or mutli-species management to an ecosystem management [15] is pertinent regarding the ecology but it initially involves considerably increased management costs and secondly is prey to the same problems as the previous system if the tools and methods that can be used for public policies and management purposes are not changed. In this way, as C. Nauen [26] underlines, these changes require the mobilisation and organisation of knowledge, learning and action both in industrialised and developing countries on a broad front.

CONCLUSION: THE ECOST PROJECT

The main objective of the ECOST project is to develop a new approach for the evaluation of fishing activities and fishing policies in order to contribute to a better management of aquatic resources which affect sustainable development in coastal zones around the world. For that purpose, a new approach based on the concept of societal cost will be developed. The project adopts the logic of the Johannesburg Plan of Implementation (JPoI) to restore as much as possible marine ecosystems by 2015. This also follows the philosophy of the Code of Conduct for Responsible Fisheries (CCRF). The project mobilises 16 renowned scientific organisations to carry out joint research to meet that challenge, but is also associated with seven regional and international UN, development and management institutions and has close connections with NGOs in order to facilitate interaction with social actors and the dissemination of results and methods to the various levels of decision-making (local, national, regional and international).

The project thus involves altogether 23 partners and is geographically spread over three regions: Africa, Asia and Caribbean (with the involvement of three countries for each region). Regions are characterised respectively by ecosystems of coastal upwelling (West Africa with Guinea, Senegal and Guinea Bissau), delta (South East Asia with China, Vietnam and Thailand) and coral reef (Caribbean with Trinidad and Tobago, Jamaica and the Dominican Republic). Within each region/ecosystem (eco-region) several fisheries have been selected as representative of regional and, indeed, global fishing activities. Furthermore, a marine protected area will be chosen in order to establish comparative analysis within each eco-region and to serve as a reference point.

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