



Multilevel governance and management of shared stocks with integrated markets: The European anchovy case

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ABSTRACT

Bioeconomics of shared stocks and integration between markets are two aspects often debated in the literature but rarely analyzed together. Although both aspects are essential for the economic optimization of the fisheries, the general impression is that the European governance, at every level, is at the moment more concerned with the biological interactions rather than the market interactions of landings. The objective of the study is therefore to focus these two elements using as case studies the two shared European anchovy fisheries of Croatia and Italy in the Adriatic Sea and France and Spain in the Bay of Biscay. The analysis is carried out by means of the Institutional Analysis and Development (IAD) framework for the description of the system, and through a graphical bioeconomic tool in order to explain causal interactions between rules, stocks, landings and prices, and possible equilibrium solutions. The analysis confirms that, with the exception of some differences in the governance structure, management authorities are more concerned with biological interactions in the Atlantic, while in the Mediterranean Sea cooperation is very poor. On the other hand trade, especially from Italy to Spain, is an important factor to balance disequilibrium between supply and demand and for the formation of price. The analysis also shows how coordinated planning of two shared stocks, in two European sea-basins, exploited by four countries, could achieve a more profitable exploitation, leading to higher stocks of anchovy and increased economic profit for the fisheries. However this kind of cooperation should have a bottom-up origin, with the Producer Organizations as key actors.

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1. Introduction

The 1982 UN Convention on the Law of the Sea calls upon States to cooperate, or at the very least to negotiate, with respect to the management and conservation of all categories of shared stocks [1], where shared stocks can be defined as a group of commercially exploitable organisms distributed over the boundary between two or more national (or international) jurisdictions [2]. Thus, in the case of shared resources, national authorities have, firstly, to negotiate agreements externally, with other international counterparts and, secondly, to decide management rules internally. The goals of both processes and the respective rules can be decided with a classical top-down (possibly science based) approach, or sharing the decisions with the stakeholders of the fishing industry. This second case is known as co-management [3]. Actually, there are a number of management tasks (including policy formulation, resource estimation, access rights, harvesting regulation, market regulation,

monitoring, control and enforcement) and each of them could be subject to different forms of decentralization and delegation [3].

Literature has abundantly debated on multilevel governance in recent years and co-management has been the most widely discussed institutional form for dealing with commons management at two or more levels [4,5]. Marine commons, mainly due to the free movement between neighbouring areas of both the resources and the resource users, are not an exception to this approach.

Management of European fisheries can be particularly complex, due to the closeness of many countries and the coexistence of national, communitarian (EU) and international institutions. Here, most of the stocks are shared, and every year the European Union establishes total allowable catches (TACs) for more than thirty species only in the waters of the North Sea and Atlantic Ocean. The allocation of fishing opportunities and the distribution among Member States is a communitarian prerogative. Furthermore, the EU has to negotiate with neighbouring countries through bilateral agreements (such as those established with Norway, Iceland and Morocco) or inside of Regional Fishery Bodies (ICCAT and NEAFC among others).

In this paper, the management of shared stocks is associated with another geographic element: the integration between markets.

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In fact, it is quite common that two or more stocks of the same species are geographically isolated (so that the two fisheries are technically independent) but there exists a single market with linked prices [6–8]. In this case, prices obtained for the landings of one stock are conditioned by the catches of the species, although the stocks are different. Management decisions cannot be indifferent to this aspect.

The governance of species that have international economic relevance and that are characterized by shared stocks between countries and integrated markets is an area of the literature little studied. Comparing the lists of shared stocks [9–11] and recent literature on market integration [12] species to be included in this category are anchovy, herring, cod, hake, whiting, sole, among others. Although both aspects (shared stocks and integrated markets) are essential for the economic optimization of the fisheries, the general impression is that governance, at every level, is at the moment more concerned about the biological interactions rather than the market interactions of landings.

The objective of this study is to investigate the governance of such species, taking the European anchovy (*Engraulis encrasicolus*) fishery as a study case, focusing on the fisheries of four countries in two important sea basins: the French and Spanish fisheries in the Bay of Biscay, and the Italian and Croatian fisheries in the Adriatic Sea. The two sea-basins are important examples of the different governance frameworks and management tools in force in the Atlantic and Mediterranean seas. The study will be carried out by means of the Institutional Analysis and Development (IAD) framework for the description of the systems (attributes of the context, actors involved, past interactions and outcomes); furthermore, the high elasticity of this framework will permit the use of a graphical bioeconomic tool in order to explain causal interactions between rules, stocks, landings and prices, and possible equilibrium solutions.

1.1. The fishery and trade of European anchovy in the world

More than one hundred species are known in the world with the name of anchovy, anchoa or anchoveta. Many of them belong to the genus *Engraulis*. Total world catches varies between six and fourteen million metric tons; more than half of the production corresponds to anchoveta or Peruvian anchovy (*Engraulis rigens*), whose strong fluctuations are also responsible for global highs and lows of anchovy quantities on the market. European anchovy (*E. encrasicolus*), on the other hand, contributes only 5% of the total anchovy production (1990–2008 average, in [13]).

European anchovy is distributed along the east coasts of the Atlantic Ocean, from Norway to South Africa; the Mediterranean and Black Seas also have important stocks of this species. The fisheries and trade of anchovy of four Mediterranean countries are worthy of special attention. These countries are Croatia, France, Italy and Spain. Altogether these four countries sum about 17% of the world European anchovy catches¹ (so, less than 1% of total anchovy catches); on the other hand, they sum about 88% of total fresh anchovy imports, and about 88% of total fresh anchovy exports (1990–2008 average, [13]). In other words, only European anchovy, among all the anchovy species, is traded as a fresh product, and these four countries are responsible for a large part of the exchanges. In general, Spain is the main importer of fresh anchovies while France and Croatia are essentially exporters. Italy is generally an exporter but, depending on local and foreign supply and demand, can sometimes be a net importer. While around 70% of French landings are normally exported (basically to Spain), an average of 18% of the Italian production is exported

(basically to Spain). Both Spain and Italy have an important tradition in the processing of anchovies.

France and Spain can exploit different anchovy stocks in the Atlantic Ocean or in the Mediterranean Sea. On the Atlantic coast of Europe there are two stocks of anchovy, one in the Bay of Biscay (VIII ICES Subarea—divisions VIIIa, VIIIb and VIIIc, exploited by Spain and France) and the second on the coasts of the Iberian Peninsula (IXa ICES Division, exploited by Spain and Portugal). Several stocks are also distributed along the Mediterranean coasts. Spain catches are concentrated in the 1.1 GFCM Division (Balearic Sea), French catches in the 1.2 GFCM Division (Gulf of Lions), while Italian catches come from the 1.3 (Sardinia Sea), 2.1 (Adriatic Sea) and 2.2 GFCM divisions (Ionian Sea). All Croatian catches are realized in the Adriatic Sea. Adriatic Sea (2.1 GFCM division) and Bay of Biscay (VIII ICES Subarea) can be considered the most representative sea basins for the anchovy economy in the four countries. Together, they sum 55% of the total production. Furthermore, they are interesting cases for the management of shared resources.

Fig. 1 shows the aggregated production of Spain and France, together with the export from Italy to Spain, and the landing prices in the three countries. Spanish and French production suddenly precipitated after 2002, due to stock decreases both in the Bay of Biscay and in the Western Mediterranean². Without internal and French production, Spain had to increase its imports from Italy. Prices strongly increased in France and Spain, while the increase in Italy was moderate. Slightly more marked was the increase of the price for the Italian exports. From 2002 to 2006, both the volumes of fresh anchovies exported from Italy and their prices increased, attesting a strong Spanish demand for Italian anchovies. After 2006, both prices and exports dropped, although production in France and Spain remained low. Correlation, a preliminary analysis to more analytical market integration studies [14], confirms that integration is stronger between Spain and France (correlation coefficient: 0.87) than between Spain and Italy (0.47). The correlation coefficient between Spanish landing prices and import prices from Italy is 0.60.

2. Material and methods

The Institutional Analysis and Development (IAD) framework [16–18] is frequently used to investigate the governance of marine commons [19]. The framework can facilitate the analysis of complex social–ecological systems [20] by developing an appropriate theoretical language and focusing on several aspects characterized by cause–effect relationships. These aspects are the following (Fig. 2): the exogenous variables, or attributes, of the context (biophysical attributes, community's attributes, institutional setting); the action arena (the social place where participants, considering potential outcomes, action–outcome linkages, cost and benefits associated to actions and outcomes, make decisions); the interactions generated and the outcomes produced. Outcomes feed back onto the participants and the context and may transform both over time. At a lower level, and in the short run, participants can simply change their strategies and routine decisions; at a higher level, and in the long run, if interactions and outcomes are deemed unsatisfying or unfair, some will raise questions about trying to change what was firstly considered exogenous, namely the rules and the institutional setting [17].

² Captures of anchovy in the Bay of Biscay fell dramatically following the Prestige oil spill in 2002 from 19MT in 2001 to 2.78MT in 2003 [64]. However no conclusive evidence of biological effects from the spill was noted in biomass variability of the anchovy stock [65].

¹ Approximately 70% including only countries from the European continent (Russian Federation excluded).

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