Fishery Management and Bioeconomics

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Abstract

Many fisheries management systems have failed to prevent severe over-fishing, this fact compelled them to provide more effort to best understand the question. Since 1931 with Hotelling works [3], once the harvested resource generate income, the adequate conceptual framework for fishery analysis was identified as capital theory. The harvested resource was assimilated to a capital with natural growth and mortality rate due to fishery. From this scope, environmental questions were underestimated, taking advantage to only economic aspect. In order to help decision makers to identify a set of management measures, global models were built. These preoccupations motivated the development of the *bioeconomics*.

C.W.Clark was the first to introduce bioeconomics in fishery management. In 1970 [2] he built what was called the Fundamental Fishery Model. Its analysis together with responsiveness of decision makers, was useful to preserve pacific whales. Follows a reach literature on the topic, particularly the Barcelone's school (`http://www.icm.csic.es/`) and the Bergen's school (`http://www.uib.no/node/58393`). They contributed with a set of models that generalize or adapt the Fundamental Fishery Model to specific resources or regulation situations.

Following this tradition, since 2000 and according to Moroccan fishery regulation, we contributed, with my research team, to the task by building and analyzing several models that we aim to present some.

Knowing that Moroccan fishery department plan out the operation of European Union fishing from the Moroccan Atlantic Coast, we built a first model that includes variables and parameters related to the presence of a domestic fleet as well as a distant water fishing nation [8]. Its analysis suggests a way to share the harvesting between two fleets. Two optimal scenarios were developed and in each of them a solution was given.

In parallel, together with Pierre Auger, we focus to study the dynamics of a fish stock, particularly sardines, exploited on several fishing zone (Zone A, B, C in Moroccan Atlantic coast) [7, 6, 1].

Concerned with durability issues of the sector, we also generalized Clark's fundamental fishing model to several situations, such as continuous fishing effort, variable prices, investment policy, protected area [10, 9, 5, 4]. Giving up step by step the maximization profit's objective, we focus on the stabilizability questions which are more appropriate to the durability issues.

In this talk we present our main results, from modeling, to stability results, optimality and analysis of solution behaviors up to numerical simulations. Although, we are be able to give recommendations for fisheries.

References

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