Design and Implementation of Optimal Management Systems for European Fisheries

Reporting

Project Information

DIOMFISH

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Final Report Summary - DIOMFISH (Design and Implementation of Optimal Management Systems for European Fisheries)

DIOMFISH
Design and Implementation of Optimal Management Systems for European Fisheries

The main objective of DIOMFISH project is to analyze market and mechanism design problem for defining and allocating commonly owned fishing rights. For this real-life renewable resource allocation problem, we first analyzed currently used mechanisms in details and question if better design or improvement is possible for these mechanisms. Our main objective is to provide a set of institutional options that can be used to solve this real-life resource allocation problem, and to provide policy options for more effective and sustainable use of common natural resources. We concentrate on European Union Common Fishery Policy for the allocation process of fishing rights to contribute strengthening the scientific basis of this

policy. Later on, we work on mechanism and market design problem to be able to implement ecosystem based management systems to effectively manage fish stocks. These two objectives are mainly related to calls under the European Union HORIZON-2020 work programme 2014-2015 sustainable food security title (SFS 9 - 2014/2015: Strengthening the scientific basis of the new Common Fisheries Policy ve SFS 11 - 2014/2015: Implementation of an Ecosystem-based approach for European aquaculture). With the knowledge basis developed in this project, we also plan to apply these and other calls by forming an international research team.

The fisheries sector in European Union member countries is administered under Common Fisheries Policy (CFP). According to this management system, the total annual catch limit is determined for economically valuable species. For example, Total Allowable Catch for anchovy determined by European Commission in Baltic Sea for 2014 is 222.102 tones. The member countries share the total quota based on their historical catch rates. These quotas put a limit on the amount of fish that can be caught by each member state. These countries use different resource allocation mechanisms to distribute their total quota. Different mechanisms have their distinct advantages and disadvantages. Naturally, these distribution mechanisms or management systems affect profitability of the fisheries sector, and also sustainability of fish resources. Current mechanisms cannot be asserted to be very successful since population of many fish species are reduced to the point of extinction.

For this market the main question is related to how to allocate these national quotas to fishermen with different fishing technologies (trawl, sweeping net, conveyor, and others). For example, trawlers' nets destroy marine ecosystem and it is expected that relatively less quotas should be assigned to these fishermen. The next step for these mechanisms is to design effective control and punishment system for the enforcement of quotas assigned to these fishermen. In this project, we combined these steps and designed a new management system that does not have the defects of currently used mechanisms. As a result of this management system, extinction of fish stocks may be prevented since total allowable catch is restricted, and sustainable fishery conditions are implemented.

In the determination process of individual fishing rights, three different allocation mechanisms are used: grandfathering, equal sharing and auction mechanisms. In the grandfathering rule, fishing quotas assigned to a fisherman depends on his or her historical harvest ratio in the total harvest of all fishermen. That is, it is a proportional rule based on historical catches. It is easy to see that this rule may not be used for sustainable fish stocks because fishermen who harvested a lot in the past and contributed to overexploitation of the fish stock still gets a higher share of the quotas with this mechanism and the same overexploitation process continues. In the equal sharing rule, total quota is distributed among fishermen equally. This rule also does not take into account the effects of different harvesting technologies on marine ecosystem and hence it may not be used to achieve sustainable fish stocks target as the previous rule. In the third mechanism, fishing rights are sold or leased to fishermen using an auction mechanism. The biggest problem related to this mechanisms is the concentration problem, fishing rights may be concentrated on a small number of fishermen and this leads to elimination of small-scale fishermen and coastal fishing communities.

Our results have a potential to find solutions to real-life effective and sustainable use of renewable biological resources problem. We used the tools of mechanism design and game theory to achieve the milestones of the project. In this regard, we studied different bioeconomic models that closely represent all

milestones of the project. In this regard, we studied different bioeconomic models that closely represent all players in the EU fishing sector. Our main target was to solve the implementation problem of a well-designed management system for sustainable management of fish stocks, and investigate the relationship among primary reform proposals of the last Common Fishery Policy Reform such as maximum sustainable yield, transferable fishing concessions and the social dimension of the CFP reform.

To achieve its objectives DIOMFISH has produced high quality research results under review in top field journals and published in international conferences:

• Not only biological limitations due to the biological structure of different fish populations but also composition of fisheries and different fishing technologies should be taken into consideration in the determination process of maximum catch limits (or property rights).

• Allocating the quotas in a Member State according to history depended proportional distribution rule or auctioning may not provide economically and biologically viable solutions to achieve maximum sustainable yield (MSY) harvesting conditions.

• The technological structure of the fishing industry and the biological structure of fish populations should be considered in the process of distributing national quotas so as to achieve MSY.

• Quota shares allocation mechanisms and restrictions on the transferability of quotas are determinants to reduce the effects of fishing on the total biomass.

• Reserving a certain fraction of total quotas for only small-scale fishermen results in a higher level of total biomass growth in each period and hence less time for achieving MSY harvesting conditions.

• Member States can protect their coastal communities from the undesired results of the TFC system by reserving a certain fraction of total quotas for only small-scale fishermen, and putting restrictions on the transferability of these quotas. These restrictions are effective in stabilizing the employment level in the fish catching sector that could be potentially affected by the concentration problem.

• The promise of TFCs depends on the design of the quota allocation process and the market structure for quotas, which can be transferable, nontransferable for all fishermen or nontransferable only for small scale fishermen. TFCs can be much more effective to achieve economically and socially sustainable fisheries if a part of national quotas is assigned to small-scale fishermen.

The researchers also maintained a professional website for dissemination of key findings of the project. The website contains information about the project, objectives, methodology, selected dissemination reports and presentations. More detailed information can be found at http://www.diomfish.com/.

Further information:
Asst. Prof. Serkan Kucuksenel
METU, Ankara
http://www.metu.edu.tr/~kuserkan/
kuserkan@metu.edu.tr

kuserkan@metu.edu.tr

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