



SCENARIOS FOR THE SHARED FISHERY RESOURCES IN MEDITERRANEAN SEA: APPLICATION OF GAME THEORY TO THE BEHAVIOR OF THE ITALIAN BOTTOM TRAWL FISHERY

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The international fisheries management has a high level of complexity due to ecological, economic, cultural, social and legal aspects. Fishers' behavior and fleet dynamics have been indicated as fundamental factors to be considered in fisheries management, together with resource dynamics and environmental changes. Indeed, most fisheries management failures may derive more from misinterpretations or erroneous predictions about fishers' behavior than from limited knowledge about resource status. The putative management based mainly on reduction in fishing capacity seems to have failed in the Mediterranean Sea and a significant reason for the alarming situation of Mediterranean stocks seems to be the ineffectiveness of the current effort system to control the fishing mortality (F).

Vessel Monitoring System (VMS) and Automatic Information System (AIS) are tools that allow tracking position of trawlers (fishing vessels using the bottom otter trawl gear) with a Length Over All (LOA) > 15 m (OTBover15 hereafter). These data are extremely useful to analyse fleet activity and to help understanding the complex interactions among units in search of resources.

VMS data about the activity of the Italian trawlers in the years 2009-2016 have been used, during the first year of PhD activity, to reconstruct the fishing effort deployed by the Italian trawlers in the seven Italian GSAs (GFCM Geographical Subareas), for each year of the period 2009-2016. This estimation of the fishing activity was obtained by computing the mean fishing days (FD) per year for a subset of the whole OTBover15 fleet and then expanding this mean to the whole OTBover15 fleet. This independent estimate was compared to the official effort one (Fishing Effort Regimes Data) and used to investigate its relationship with landings and fishing mortality for some key stocks. The next step will deal to the detailed characterization of trawling activity with respect to space (i.e. GSA, sea bottom type, distance from the harbour, bathymetric stratum, etc.), time (seasons, daytime, ratio between fishing time and steaming time, length of the fishing trip) and target species. Assuming that all these combined aspects determine the "strategy" of each fishing vessel, the strategic changes occurred during the period 2009-2016 and the related drivers (economic factors, environmental conditions and status of resources) will be investigated. The final step will be represented by the application of Game Theory to the emerging patterns. To do this, a bioeconomic model for a subset of vessels will be set up and the profits related to the applied fishing strategy will be used to estimate the function for non-cooperative solutions. Non-cooperative solution concept will be used as a realistic method for predicting effort dynamics of trawlers in the Mediterranean Sea and as potential reactions to incoming management approaches.