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Rebuilding EU fish stocks and fisheries, a process under way?

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ABSTRACT

As a signatory to the World Summit on Sustainable Development (WSSD), the European Union (EU) has made a commitment to maintain or restore fish stocks to levels that can produce the maximum sustainable yield (MSY), and where possible not later than 2015. So how has the EU's Common Fisheries Policy (CFP) fared in trying to achieve this objective? The development of the status of 41 commercially exploited fish stocks from the North East Atlantic, North Sea and Baltic Sea (FAO Area 27) was analysed together with the economic performance of the fleets exploiting those stocks. The analyses indicate that the exploitation status for many of the stocks has greatly improved during the last 10 years while the economic performance of the fleets over the same period has been highly variable. The main economic indicators (gross value added (GVA) and operating cash flow (OCF)) have gradually improved at a time when the general economic situation, which has a great influence on the markets, costs and purchase power, has worsened. While recognizing that much remains to be done to achieve the objective of the WSSD, the analyses indicate that actions implemented in the last decade under the CFP have led to an improvement in the status of many commercially important fish stocks and their fleets towards levels that are closer to those producing MSY.

1. Introduction

Around 80% of the world's exploited fish stocks are currently considered to be overexploited [1]. Recent re-analysis of world-wide catch data indicates an increasing percentage of over-exploited, depleted, and in some cases recovering stocks and decreasing trends in the proportion of underexploited and moderately exploited stocks [2]. In this respect, the European marine resources as a whole are no exception [3]. As a signatory to the World Summit on Sustainable Development (WSSD) [4], the European Union (EU) has made a commitment to maintain or restore stocks to levels that can produce the Maximum Sustainable Yield (MSY), with the aim of achieving these goals on an urgent basis and where possible not later than 2015. MSY is generally defined as the maximum use that a renewable resource can sustain without impairing its renewability through natural growth and replenishment (OECD definition; http://stats.oecd.org/glossary/; accessed on 28.09.2012). Moreover, the plan of implementation adopted during the WSSD encourages the application of the ecosystem approach to fisheries management (EAF) [5] by 2010, the elimination of destructive fishing practices and the establishment of marine protected areas consistent with international laws and based on scientific information. Nonetheless, 10 years after the WSSD, most stocks in European waters (88%) are still considered to be overfished and 30% of them are estimated to be outside safe biological limits, which means that they may not be able to replenish [3]. Thus, up to 2010, Europe is still far from achieving the objectives agreed at the WSSD in 2002 [6]. In this perspective, the Common Fisheries Policy (CFP) has been considered ineffective in terms of reducing fishing capacity [7] as well as in rebuilding marine ecosystems [8] but see also [9] for a critique. Furthermore, the fishery sector is still

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considered to suffer from overfishing, fleet overcapacity, heavy subsidies, low economic resilience and decline in the volume of catches and mean sizes of fish caught [10]. According to latest estimates, in order to restore overfished stocks, the global fishing capacity needs to be cut by 36–43% from the 2008 level, with a likely loss of employment of 12–15 millions fishers and costing US$ 96–358 billion for buyback [11]. Considered from this standpoint, it is indisputable that most of the management objectives of the WSSD have not yet been accomplished, and thus up to 2010 the CFP has not been successful [12]. This is especially true regarding the proposed phasing out of subsidies, the prohibition, reduction or limitation of fishing practices that have a negative impact on the marine habitat such as bottom trawling, and the elimination of discards through the use of highly selective gears [13,14].

The recurrent and pessimistic "mantra" that the CFP has completely failed, is not only pervading the most recent scientific literature but has also become the common perception of the general public, the media and numerous stakeholders [15], although this perception is not universal [16,17]. European waters encompass several large marine ecosystems, such as the North East Atlantic, Baltic, Mediterranean and Black Seas. Such eco-regions are ecologically unique and support diverse communities of marine organisms which historically have been subject to different levels of exploitation and different advisory and management regimes [18]. Given the diversity of such eco-regions and their different historical developments, the question whether it is reasonable to accept the sweeping generalization that the CFP has completely failed and the status and outlook for stocks and fisheries in European waters is generally pessimistic has been addressed. Has there really been no significant progress towards CFP objectives during the last 10 years in any of the European seas?

To address these questions, the status of commercially exploited fish stocks from the North East Atlantic, North Sea and Baltic Sea (Fig. 1; FAO Area 27) has been analysed together with the economic performance of the EU fleets exploiting those stocks [19].

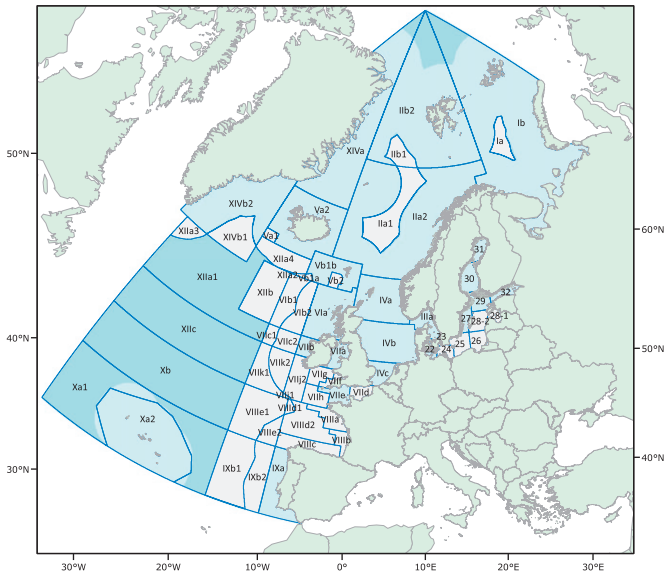

Fig. 1. Map of the ICES area with the different stocks analysed. The colouring (light and darker blue) indicates in- and outside Exclusive Economic Zone (EEZ) (according to http://www.vliz.be/vmdcdata/marbound/; accessed on the 28/09/2012) (see Table 1 for details). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

2. Materials and methods

2.1. Stock assessment data

Using the results of the 2011 ICES (International Council for the Exploration of the Sea; http://ices.dk/advice/icesadvice.asp; accessed on 28.09.2012) assessments for fish stocks from the Northeast Atlantic, North Sea and Baltic Sea [20], the following metrics, where available, were collated:

Fishing mortality (F, the instantaneous rate of fishing mortality i.e. the rate per unit time at which fish are dying due to fishing)
Spawning stock biomass (SSB, the biomass of fish able to reproduce)
Management target biological reference points (i.e. F_{target} and SSB_{target})

The assembled metrics are given in Table 1 and following [6,16,21] and [22], the exploitation rate and biomass were compared against their management target biological reference points, i.e. F_{target} and SSB_{target}. The ratio between F and F_{target} and between SSB and SSB_{target} are indicators of the exploitation rate and spawning stock biomass relative to their respective management target biological reference points, with values over 1 indicating that F is greater than F_{target} and values under 1 indicating that SSB is below SSB_{target}.

In our analysis, SSB_{target} is either the value corresponding to the value for $SSB_{trigger}$ as estimated by ICES or the target level of SSB specified in any agreed management plan (i.e.SSB_{MP}). Both values usually correspond to the level of SSB below which recruitment is likely to be impaired. If stocks are assessed to be below the $SSB_{trigger}$ or SSB_{MP} reference points, ICES would advise that remedial action should be taken. Therefore, when SSB is above SSB_{target} the probability of impaired recruitment is expected to be low. SSB_{target} is considered the lower bound of fluctuation around the SSB that corresponds to MSY. It is therefore a biomass reference point that triggers a cautious response; the cautious response is to reduce fishing mortality to allow a stock to rebuild and fluctuate around a notional value of SSB that corresponds to MSY. This concept evolves from the precautionary approach (PA) reference point SSB_{PA} that ICES has used as a basis for fisheries advice since the late 1990s and therefore in the ICES framework, SSB_{target} is usually equal to or higher than the former SSB_{PA} [20]. For five stocks, and in absence of a defined $SSB_{trigger}$ or SSB_{MP}, SSB_{PA} as SSB_{target} was chosen.

For about 19% of the stocks in Table 1, neither SSB_{target}, SSB_{MP} nor SSB_{PA} are defined by ICES. To estimate a proxy of SSB_{target}, the maximum observed SSB in the time series (SSB_{MAX}) was estimated and then calculated the average ratio between SSB_{target} and SSB_{MAX} for those stocks for which an estimate of SSB_{target} was available. SSB_{target} estimates were on average around 39% of the observed SSB_{MAX} and thus this value was used for those stocks for which SSB_{target} cannot be defined (Table 1).

F_{target} was chosen as the value generally referred to by ICES as the estimated proxy of F_{MSY} or defined as F target in the current management plan (F_{MP}) [20]. These values are estimated using simulations or yield per recruit analysis and are used to generate yearly catch advice that is used as basis by EU to set annual TACs. For two stocks, and in absence of a defined F_{target} or F_{MP}, F_{PA} as F_{target} [20] was chosen.

Using the data in Table 1, we also fitted a GAM (i.e. generalized additive model) assuming a gaussian distribution and identity link to explore the effect of different variables (i.e. predictors) on the estimated change in F between 2001 and 2010 (i.e. response). The predictors used were area group, species group, the ratio