



# The “easy restriction” syndrome drive local fish stocks to extinction: The case of the management of Swedish coastal populations



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## ABSTRACT

Spatially sensitive management built on detailed biological and socio-economic knowledge is required to establish sound fishing regulations and to avoid extinction of small coastal populations of fish and shellfish. Highly productive isolated populations of several commercial species have historically inhabited the Swedish west coast, but during the past century these populations have been depleted by fisheries and with no sign of recovery. Since 1999 several fisheries regulations and different stakeholder co-management initiatives have flourished along the Swedish coast of the Skagerrak. They aimed to facilitate the recovery of collapsed local stocks but the established regulations failed to identify and restrict the main sources of mortality acting on local stocks and they have thus been ineffective to promote the recovery. Furthermore, regulations have operated on the weakest among stakeholders (e.g. recreational fishers), which have minor influence over management, and the restrictions have been imposed without providing any data which supported the choice (i.e. the “easy restriction” syndrome). In line with the general “spirit” of recent Swedish fishery management, we conclude that managers, without the disapproval of Swedish scientists, have circumvented limitations which should address the largest mortality factor, i.e. the commercial fishery. The regulations presently in place, have been politically uncontroversial and easy to implement, but have been highly unsuccessful. We therefore suggest that stakeholders, including politicians, should start focusing on more effective and science-based management and less on what is politically attractive if Swedish citizens shall have a chance to witness the recovery of their once flourishing coastal populations.

## 1. Introduction

Several recent analyses have revealed that most of the world's well-studied commercial fish species (e.g. eels, salmonids, tunas, cod and herring) are structured by mechanisms of natal homing [1 and references therein]. For example in the North Atlantic, cod is a mosaic of separated population entities [2] and failure to account for such a complexity in fishery management might lead to depletion of the population structure [3] and eventually to local extinction [4]. This implies that spatially separated stocks need individual, spatially sensitive management [5] and it suggests that decision-making that builds on detailed, accurate, local, biological and socio-economical knowledge is needed in order to avoid extinction of resident small populations of fish.

The Swedish coast of the Skagerrak has historically been inhabited by local coastal populations of several species such as cod (*Gadus morhua*), plaice (*Pleuronectes platessa*), haddock (*Melanogrammus aeglefinus*), pollack (*Pollachius pollachius*), whiting (*Merlangus merlangus*), turbot (*Scophthalmus maximus*) and European lobster (*Homarus*

*gammarus*) [6–11]. Along the Swedish coast of the Skagerrak, the areas between the islands of Tjörn and Orust and the mainland (i.e. the 8-fjords area) together with the neighbouring Gullmar fjord (Fig. 1) have been particularly productive in the past, supporting large coastal populations of different species [12]. However, these populations have been greatly depleted by intense fisheries during the past century with no sign of recovery [11,12].

The aim of this paper is threefold: i) to gather all available information on the status of the local fish populations in the 8-fjords area; ii) to demonstrate how two decades of management policies targeting weak stakeholders (e.g. recreational fishermen) while protecting commercial fisheries targeting Norway lobster and Northern shrimp, have failed to identify the major sources of mortality for local populations of cod and flatfishes in the 8-fjords area and have *de facto* hindered their recovery and iii) to generate operational policy advice for the recovery of local stocks along the Swedish coast of the Skagerrak.

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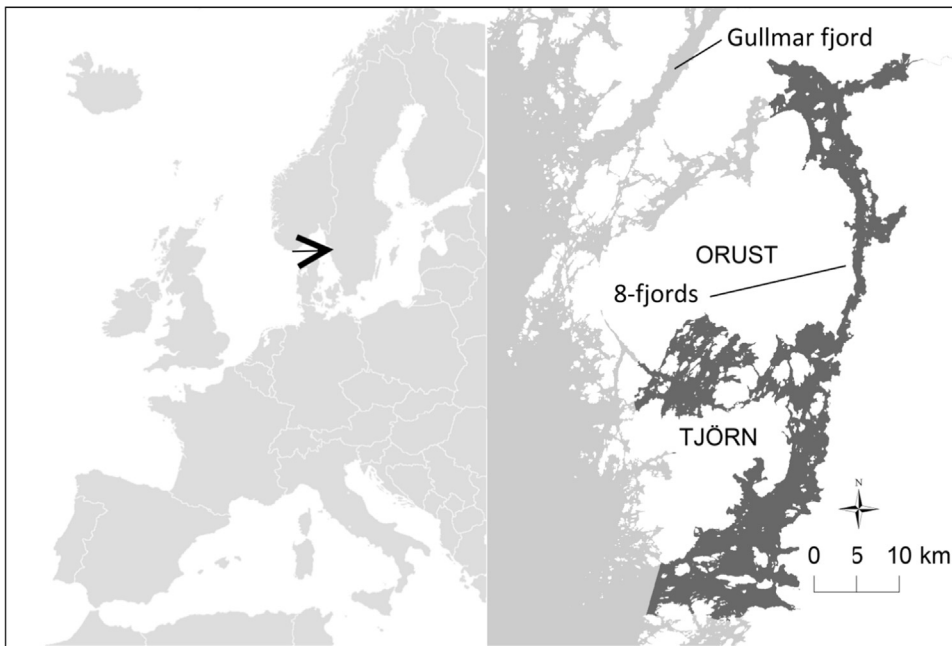


Fig. 1. Map of the 8-fjords area (in dark grey) and the Gullmar fjord located along the Swedish west coast.

## 2. Management of Swedish Skagerrak coastal populations and the “easy restriction” syndrome

Since 1999, the 8-fjords area and the Gullmar fjord have been subjected to several regulations [13] and different stakeholder co-management initiatives [12]. One of the main goals of the Gullmar fjord regulations and the 8-fjords initiatives has been to facilitate the recovery of collapsed local demersal fish stocks [8,10], predominantly through the implementation of severe fishery limitations. A recent paper [12] has described the local initiatives and summarised how the application of the central principles of the Ecosystem Approach to Fisheries (EAF) [14] within the 8-fjords area initiatives has been used. It has been argued that the pillars of the 8-fjords initiative will constitute a leading example for the application of EAF to recover depleted local stocks in Sweden and elsewhere [12]. According to the authors, one of the main strengths of the 8-fjords initiative is the heavy involvement of stakeholders in deciding upon restrictions to be implemented. On the other hand, the authors identify the scarcity of suitable key indicators and the lack of knowledge of local demersal fish stocks and their spawning habitats (i.e. the “not enough data” syndrome) as the main weaknesses of the current management of the 8-fjords area.

In contrast to [12], regulations established in the Gullmar fjord and the 8-fjords may have succeeded to accurately analyse key components of the ecosystem principles but have failed to identify the main sources of mortality acting on the local stocks. Knowledge of those factors is essential when addressing stock recovery. Regulations in place have simply targeted the weakest among stakeholders (e.g. recreational fishers), imposing restrictions without any analysis and data supporting the present management (i.e. the “easy restriction” syndrome). Instead, and in line with the general “spirit” of recent Swedish fishery management, managers, without the disapproval of Swedish scientists have circumvented limitations which should focus on the largest mortality factor, i.e. commercial fishery and have failed to evaluate the contribution of mortality imposed by seals and seabirds on the lack of recovery of local fish stocks. These factors have in other areas been shown to be significantly important causes of mortality [15,16] and this was recently found also for the Gullmar fjord [17]. Moreover, both the Gullmar fjord and the 8-fjords area are subject to regular monitoring [18]. Therefore the “not enough data” syndrome should not apply in these cases and hence no additional ecological indicators are necessary for an assessment of the areas as argued by other authors [12]. The

recovery of the putative remaining local gadoid populations would easily be detected during the regular yearly trawl surveys as it was detected during the trawl surveys in the 1960s [8,10]. In this particular case, gadoids are considered top predator fish in the North Sea and are already used as key indicators of the status of the marine ecosystem. In fact, gadoids are considered key species in the large fish indicator (LFI), which was developed within the “Marine Strategy Framework Directive” (MSFD; 2008/56/EC) to establish an operational ecosystem approach to fishery management and to monitor the status of the marine environment in Europe.

## 3. The 8-fjords management initiative

The 8-fjords initiative was launched in 1999 but the actual start was in 2010. The commercial fisheries that remained at that time were mainly targeting herring and sprat as stocks of gadoids and flatfishes were already commercially extinct in those areas [9,11]. However, even during the 1960s, the proportion of herring and sprat caught in the 8-fjords was less than 1% of the total Swedish catches of those species in the Skagerrak area [19]. Thus, the exclusion of the herring and sprat fisheries from the 8-fjords was uncontroversial from a socio-economical point of view. However, a small gillnet fishery, especially targeting turbot, was still present in the area but it was mainly conducted by recreational fishers, which were easily excluded by the stakeholder co-management initiatives [12] as they, compared to the representatives of commercial fishery for sprat and herring, historically lacked political power. The only fishery potentially left in this area was for European lobster as the 8-fjords area is too shallow for Norway lobster (*Nephrops norvegicus*) and Northern shrimp (*Pandalus borealis*). The European lobster stock along the Swedish west coast, including the 8-fjords area, was and is still considered heavily depleted [11]. Despite many years of a negative trend, the stakeholder co-management initiatives have done nothing specific in terms of management for European lobster in the 8-fjords area [12]. However, now a national management body is considering regulating the European lobster fishery along the entire Swedish west coast. It is unclear if all European lobster fisheries in Sweden will be regulated or if it will only be the recreational (J. Hjelm, pers. com.). A similar decision which strengthen the “easy restriction” syndrome argument was taken in 2007 when recreational fishery for eel (*Anguilla anguilla*), a species which is considered highly depleted [20], was banned in Sweden while specialized (i.e. efficient) commercial

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