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Abstract: The reformed Common Fisheries Policy (CFP), adopted by the European Union in 2013, aims to achieve sustainable exploitation of marine resources. Beyond the mainstream of stakeholders' engagement, the literature increasingly calls for shared accountability in fisheries management. In such scenarios, identifying stakeholders' insights becomes critical for a successful design of innovative management approaches. This paper analyses how the stakeholders perceive a results-based management system for four fisheries in different European sea-basins as well as at a pan-European level. The results indicate a need for adaptive and participatory management approaches, building on regional adaptations within transparent and plural frameworks for fisheries. To succeed, the system should explicitly address its associated public and private costs; neither participation nor accountability comes for free.

Cover Letter

Vigo, February 15, 2015

Dear Editor,

We hereby attach the manuscript entitled "Is Europe ready for a results-based approach to fisheries management? The voice of stakeholders" to be considered for publication in Marine Policy. This manuscript has an innovative message advocating for the involvement of stakeholders in management. Particularly, it provides insights of how the European stakeholders perceive a proposed result-based approach for fisheries management. Additionally, this article analyses the barriers for the implementation of a new management system (developed in the frame of the EcoFishMan project, funded by the EU 7th Framework Programme), identifying areas of harmony and conflict among more than 170 high-profile stakeholders.

We would like to thank you in advance for considering to publish this Original article and for being part of the revision process. In this sense, we consider the revision clear and stimulating, therefore we submit again an improved version of the article.

We confirm that the material is original, is not submitted elsewhere, and has the full written approval of all co-authors to submit. We also confirm that the authors have adhered to general guidelines for the ethical use of animals in research, the legal requirements of the country in which the work was carried out, and any institutional guidelines.

Finally, we would like to point out the clear relationship and complementarity of this manuscript with other two papers already published in the Marine Policy Journal;

- Silva C, Mendes H, Rangel M, Wise L, Erzini K, Borges MF, et al. Development of a responsive fisheries management system for the Portuguese crustacean bottom trawl fishery: Lessons learnt. Mar Policy 2015;52:19–25.
- Nielsen KN, Aschan M, Holm P. Results based management in fisheries: Delegating responsibility to resource users. Mar Policy 2015;51:442–51.

Sincerely yours,

Jose L. Santiago, Marta Ballesteros, Rosa Chapela, Cristina Silva, Kåre N. Nielsen, Mafalda Rangel, Karim Erzini, Laura Wise, Aida Campos, Maria F. Borges, Antonello Sala, Massimo Virgili, Jónas R. Viðarsson, Alan Baudron and Paul G. Fernandes.

***Detailed Response to Reviewers**

Dear reviewer,

We really think that your summary and comments on the paper are smart and acceptable. We seek to address them properly. In particular, we have carried out the following changes in order to deal with your recommendations:

- Further explanations are provided in p. 3 to 5 on what is the Responsive Fisheries Management System (RFMS); what are its main assets; and where it has been tried or tested in other places.

- We clarify the case studies:

    - In the Portuguese case (p. 11-13), we focus on (i) adequate the quotes to the rationale of the section; (ii) explain the context and the specifications of this case, remarking the fact of 2 Member States involved; (iii) detail the stakeholder motivations; (iv) address the information flow and transparency issue, and; (v) show the main results achieved by stakeholders' consensus.

    - In the North Sea case (p. 13-15), we focus on: (i) adequate the quotes to the rationale of the section; (ii) highlight the main concerns of the stakeholders on the RFMS; (iii) explain how the RFMS would address their concerns.

We hope to have dealt with your suggestions properly.

Thank you in advance for your revision.

Yours faithfully,
The authors

*Title Page (WITH Author Details)

Title

Is Europe ready for a results-based approach to fisheries management? The voice of stakeholders

Authors: Jose L. Santiago[1,2], Marta A. Ballesteros[1,2], Rosa Chapela[1], Cristina Silva[3], Kåre N. Nielsen[4], Mafalda Rangel[5], Karim Erzini[5], Laura Wise[3], Aida Campos[3], Maria F. Borges[3], Antonello Sala[6], Massimo Virgili[6], Jónas R. Viðarsson[7], Alan Baudron[8] and Paul G. Fernandes[8].

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Highlights:

1. Stakeholder analysis is a robust tool to explore alternative management systems.
2. European stakeholders prefer co-management by partnership and regional approaches.
3. Flexibility and responsiveness increase the acceptance of innovations in management.
4. Resources, organizational capacities and incentives favour to move towards participation.

IS EUROPE READY FOR A RESULTS-BASED APPROACH TO FISHERIES MANAGEMENT? THE VOICE OF STAKEHOLDERS

1. Introduction

Oceans and coastal areas provide valuable goods and services to the European economy [1–3]. The management of these marine ecosystems requires knowledge of both environmental and human dimensions, and how they are related. In natural resources management there is also an increasing recognition of the need to adopt an ecosystem-based approach, not least in relation to fisheries activities [4–8]. Recent policies, such as the reformed Common Fishery Policy (CFP) [9] or the Marine Strategy Framework Directive (MSFD) [10] enhance this holistic view of management, considering a more diverse use and users of European marine ecosystems. Building on European good governance principles [11], various stakeholders were brought in to contribute to the reform of the CFP through consultative processes. A public consultation on the former CFP [12], revealed that European stakeholders considered it to have a short-term focus, and top-down micro-management which constrained the decision-making process. The suggested alternatives showed different insights into: (i) the regionalization of fisheries policy at different scales (e.g. at regional sea level, within member state, etc.); (ii) the role of the stakeholders (e.g. advisory or implementing role); and (iii) the management system (e.g. participatory governance, co-management or self-management).

After 30 years of the CFP, its limitations in relation to biological, socio-economic and governance aspects have been well-documented [13–18]. Nevertheless, several authors have pointed out the need to overcome this pessimistic mantra of the CFP since some of the management decisions have been shown to be partly effective in the last decade [19]; as Cardinale *et al.* [20] state: “there are clear indications that actions already implemented under the CFP have led to an improvement in the status of many commercially important fish stocks towards levels that are capable of producing MSY [Maximum Sustainable Yield]”.

However, a deep-seated drawback of the CFP is its tendency to produce a "death spiral of fisheries micro-management" [21] i.e. an incremental and mainly regulatory approach that relies on highly detailed control to address the shortcomings of the policy [22,23]. Moreover, regulations do not always suit local conditions, which in turn leads to a proliferation of amending regulations and derogations laid down by authorities in a classical top-down management fashion. The outcome is a management system that has become increasingly complex [24], difficult to understand for the users, and inefficient in achieving the CFP's goals. In particular, it constrains the fishing industry's ability to adapt to shifting conditions and to improve cost-efficiency through behavioural and technological change. Meanwhile, the involvement of stakeholders in fisheries management has been gaining momentum in the policy agenda: participatory research, stakeholder engagement [25], co-production of knowledge [8,26] or even co-creation [27] have all been directed towards improving the governance of European fisheries. According to Van Vliet et al. [28], the main reasons for undertaking participation are categorized as; (i) democratic principles to relate decisions and the values of the public; (ii) instrumental arguments; (iii) legitimization of the final decision, increasing stakeholders buy-in; (iv) the integration of local knowledge; and, (v) social learning which allows for the generation of useful insights.

Stakeholder analysis is becoming a crucial tool for developing innovative management approaches for fisheries management in embedded institutional settings such as the European Union, which has multiple layers and arenas of interaction. Stakeholder participation has been a central pillar of the CFP since as far back as 2002, although there has been no legal definition for this process. This is despite an extensive body of literature on the formal mechanisms for identifying, defining, analysing and mapping stakeholders [29–34]. Evidence for the move from the active participation of stakeholders to constructive engagement through co-management is now considered a crucial element to achieving sustainable fisheries [35].

The question remains as to what extent EU stakeholders may be willing and ready to have such an active role in fisheries management. Recent consultative processes show that NGOs, some Member States, industry and the European Parliament generally support different degrees of co-management "under clear objectives and measurable targets" [12]. The European Commission [17] also suggested that:

> "The industry can be given more responsibility through self-management. Results-based management could be a move in this direction: instead of establishing rules about how to fish, the rules focus on the outcome and the more detailed implementation decisions would be left to the industry. Public authorities would set the limits within which the industry must operate, such as a maximum catch or maximum by-catch of young fish, and then give industry the authority to develop the best solutions economically and technically".

The notion of results-based management (RBM) has been used to guide reform processes within intergovernmental organisations [36,37], but to a lesser extent in the fisheries context [38–40]. This article is an output from a research project[1] that developed a framework for implementing RBM in European fisheries (named Responsive Fisheries Management System (RFMS)) and examined its feasibility. Consistent with the European Commission's ideas, the RFMS proposes that relevant authorities set specific and measurable objectives to be achieved, leaving resource users to propose ways to achieve them and to document their achievement. Additionally, the RFMS includes guidelines for authorities and resource users that wish to pursue a RBM process [41]. Critical elements in this process include the setting of operational objectives [42–44] and incentive mechanisms, the identification of means to meet the requirements, and the development of a strategy for documenting the effectiveness of the means. In this sense, the RFMS allows the resource users to focus on how defined objectives

[1] www.ecofishman.com

can be implemented, instead of a policy that regulates in detail what they may, should or should not do in their day-to-day operations (adapted to fisheries from [45]). The RFMS assigned clear roles for three involved agents:

i. The Authority, which proposes management and operational objectives, and establishes a framework in which stakeholders can assume management responsibilities.

ii. The Operator, who develops a management plan, undertakes fishing operations according to the pre-set objectives, and provides proof of achieving these objectives through a documentation system.

iii. The Auditor, who conducts systematic assessments of the implementation and performance of the management plan, focusing on whether or not objectives have been met.

While there is limited practical experience with RBM in European fisheries, existing management arrangements for the Rock Lobsters in New Zealand reflect a quite comprehensive example of the approach [46]. Another practical example of RFMS is an ongoing project[2] developed in the Algarve (South Portugal) that defines the management measures considered relevant for an octopus fishery, promoting participative monthly meetings with stakeholders involved (fishermen's associations, universities, national fisheries institute and governmental bodies). By using capacity building, operators will be prepared for designing, proposing and implementing an RFMS for the management of the octopus trap and pot fishery of the Algarve. Apart from the pilot tests pursued within the research project that this work contributes to, neither RBM, nor the more detailed RFMS, has currently been used as an approach for delegating practical management responsibility to resource users in fisheries

[2] "Tertúlia do Polvo" project, coordinated by the Centre of Marine Sciences of the University of the Algarve (May 2014 to March 2015). Press release (in Portuguese). http://www.ccmar.ualg.pt/ (last visited 20.01.15).

[47]. However, cases that apply the RBM's principles can be founded in the Clayoquot Sound (Canada) in relation to the land and resource management [48]; in the Island of Guernsey (UK) for developing sustainability indicators [48]**;** in Ria Formosa (Portugal) in a coastal management program [49]; in Chile in relation to the co-management of small-scale octopus fisheries [50]; on the island of Mallorca (Spain) for managing coastal zone fisheries [51]; in Galicia (NW Spain) in the development of community-based management for goose barnacle fisheries [52]; in the New Zealand southern scallop fishery [53]; or in the Southern Australian Spencer Gulf prawn fishery [54].

This study applies a triangulation of methods to analyse stakeholders' insights into alternative management systems for European fisheries with a focus on an RFMS system. The concept of "stakeholder" in fisheries and the methodological approach to obtain their perceptions is defined in Section 2. Section 3 examines the results of four International workshops and a survey at European level, as well as the applicability of a results-based approach in Iceland, Portugal, North Sea and Mediterranean. Finally, the feasibility of implementing this approach to manage European Union fisheries is discussed.

2. Methods

Public administrations, fishing organizations and associations, advisory agencies, environmental Non-Governmental Organizations (NGOs) and other key actors were brought together to evaluate proposals for a results-based management framework. Diverse techniques for enhancing and encouraging the stakeholder's interactions were applied to further advance the design, implementation and adaptation of the framework. As a common rule, five basic principles led these interactions: (i) ensuring inclusivity and opportunity for involvement, (ii) being clear about the use of the knowledge obtained, (iii) optimizing

resources, (iv) linking participation in management with accountability and, (v) communicating outcomes and demonstrating the benefits.

2.1. Definition and classification of stakeholders

In this paper, the stakeholder term is defined as those who use and depend on fisheries, whose activities affect it, or who have an interest in it [55]. Two groups of stakeholders were identified:

i. Direct stakeholders. Those individuals and groups who use or depend on fisheries management or, ultimately, are affected by it, either as beneficiaries (positively impacted) or disadvantaged (adversely impacted). This group is comprised mainly of management agencies at multiple levels (e.g. Regional Management Organizations, European Commission, etc.) and the fishing sector (e.g. organizations, associations, processors etc.).

ii. Indirect stakeholders. All individuals or other organizations with an interest or an intermediary role in fisheries activity (e.g. consumers, environmental NGOs, advisory bodies, etc.).

Key stakeholders of both groups, direct and indirect, were identified according to their perceived ‘‘score’’ in three dimensions of relevance: legitimacy, power and urgency [30,56]. From March 2011 to February 2014, a total of 171 stakeholders from 54 different institutions were actively involved in providing empirical data (Table 1).

INSERT TABLE 1

2.2. Data collection.

A sequence of iterative activities to collect data were structured according to the spiral model for Software Development and Enhancement [46,57]. This process was carried out in

collaboration with stakeholders both at pan-European level, as well as in specific case studies, to assess the viability of implementing a results-based management approach to different fisheries and ecoregions (Figure 1).

INSERT FIGURE 1

Qualitative data were obtained through three types of interactions with key stakeholders at multiple scales: International workshops, case studies and a survey. These interactions served to identify how management objectives, included in policies and institutions, are relevant to stakeholders, and to recognize adequate institutions and the approach to manage fisheries resources (Table 2).

INSERT TABLE 2

2.2.1 International Workshops

Four technical workshops were held to discuss and improve the proposed results-based management framework. The International Workshops were designed to include: (i) a European profile (single and mixed-fisheries and multi-level stakeholders); (ii) a policy-oriented debate; (iii) feedback (identification of advantages and gaps in knowledge). A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was used to assess the main results from the stakeholder events. Specifically, this analysis allowed for the examination and understanding of the internal and external factors that may favour or hamper a results-based management system

2.2.2 Case studies and survey

A major component of the study was a survey of key stakeholders, both at EU level as well as four case studies developed in Iceland, Portugal, Scotland and Italy [58]. There were five main

considerations in the design and analysis of interviews and meetings in the case studies: (i) a representative sample; (ii) the quality of responses; (iii) high response rates; (iv) the effects of interview design and; (v) the prevision of alternative management scenarios [59].

By directly asking those involved in case studies and through 38 structured face-to-face interviews, a Responsibilities, Rights, Revenues and Relationships analysis (4 Rs) [60] was applied. These concepts (4 Rs) were defined for this research respectively as; (i) having an obligation to manage, control or care for European fisheries; (ii) a moral or legal entitlement to manage European fisheries; (iii) an advantage or profit gained from managing European fisheries; (iv) the regard stakeholders have for each other. Each of these were assigned a ranking on a five-point Likert scale [61–63]: level 1 (none); level 2 (low); level 3 (normal); level 4 (high) and; level 5 (very high).

Additionally, stakeholders were requested to use an additional four-point Likert scale [61–63] for rating 20 proposed management priorities according to the importance to them as: level 1 (low); level 2 (normal); level 3 (high) and; level 4 (very high). These priorities were grouped as biological and environmental, socio-economic, Common Fisheries Policy and governance (Table 3).

INSERT TABLE 3

Finally, stakeholders were requested to prioritize 5 alternative management approaches [46,64] for European fisheries, according to their potential applicability, including the results-based management approach (Table 4).

INSERT TABLE 4

3. Results

Stakeholders' knowledge and insights generated essential inputs in terms of the conceptualization and potential implementation of an innovative management system for fisheries.

3.1 International Workshops

The SWOT analysis revealed the main assets of the proposed results-based framework: flexibility, responsiveness, compatibility with current policies and transparency (Table 5). The main constraints encompassed: difficulties for defining appropriate management objectives, increased costs (to operators) and limited experiences with results-based frameworks in Europe. The creation of meaningful and agreed incentives [46,65] constituted a constant challenge for the stakeholders but also represented the key for achieving success in the promotion of socio-economic and ecological sustainability in marine ecosystems. In this sense, stakeholders would not consider moving forward beyond the current *status quo* without adequate incentives, which have been shown to improve the effectiveness of the management measures, the territorial rights or the price of the ecosystem services.

INSERT TABLE 5

3.2. Application of results-based approach to four case studies

The ability to adapt management measures to each ecoregion is constantly requested by European stakeholders [17]. Such regionalisation in management should be linked to resource users' accountability, for instance, under a results-based approach. The case studies developed in Iceland, South Portugal, the North Sea and the Adriatic Sea served to examine regional approaches under this common framework. Specifically, these cases were seen as the natural

place for closer interaction as well as an opportunity to address the unique nature of each area.

Notably, the ease with which the boundaries and opportunities of the fishery could be determined contrasts with the difficulty of identifying clear management objectives. Stakeholders appeared to be more familiar with selecting ecological and biological management objectives, while the choice of economic or social ones led to more polarized positions. Other common positions among stakeholders were: (i) concerns about reversing the burden of proof due to economic limitations, (ii) coherence with governance structures at different scales and, (iii) constraints related to the legal framework for addressing self-management measures.

3.2.1 Icelandic demersal mixed fishery

The Icelandic case included around 1,500 small coastal vessels currently managed under a catch-quota system (Individual Transferable Quotas – ITQs) in ICES Division Va. This case was the perfect "Petri dish" to test a results-based approach due to the importance of fisheries to the nation, the data-rich setting and the high number of stakeholders involved. During the first iteration, the case was restricted to the small lumpfish fishery, demonstrating the applicability of the framework in fisheries and identifying previous participative management of some sort as an advantage to implement a results-based management system.

> "The Icelandic lumpfish fishery served well as a first pilot case, since it is a relatively simple fishery and the management of the fishery already has some elements of adaptive co-management i.e. the selected operator has a strong influence on the management measures issued by the authorities" (Direct stakeholder, Icelandic fishing association)

For the second iteration, the case study included the whole of the <15 m mixed demersal trawl fishery. The goal of selecting operational objectives was influenced by the number of

stakeholders involved, i.e. more participation allowed for more ambitious objectives to be set. The majority of operators engaged in the fishery did not participate (i.e. vessels > 15 m), raising concerns to small-scale operators regarding effectiveness of the means selected:

> "It felt that the results-based approach would not be realistic in the fishery if only a small number of operators were subjected to it… so efforts made by operator representatives alone are unlikely to have major effects on stock size or ecological indicators for the Icelandic mixed demersal fishery as a whole" (Direct stakeholder, Icelandic fishing association)

These concerns were raised again in other case studies. Nonetheless, the approach was perceived as an effective tool to manage small-scale vessels (i.e. vessels < 15 m), which represented a total of 17% of the Total Allowable Catch (TAC) of demersal fisheries in Iceland [58]. Common objectives and strategies allowed for the balance of biological targets (fishing at MSY and no discards), as well as economic (profitability) and social targets (employment opportunities). Therefore, this theoretical exercise served as the first step to adopt ecosystem-based management plans [66], agreed by consensus, in the Icelandic fisheries.

3.2.2. Portuguese crustacean bottom trawl fishery

The Portuguese case included all 26 Portuguese and 9 Spanish crustacean trawlers managed under TAC and effort limitations in ICES Subdivision IXa. In the Portuguese crustacean trawl fishery case study, the initial dialogue with the stakeholders included representatives of all the agents directly or indirectly dependent on, affected by, or interested in the fishery (government administration, fishing operators, research, market sector, consumers and non-governmental organizations) [67]. Considering that fishing activity is carried out by Portuguese and Spanish operators, the dialogues were extended to all operators, initiating for the first time cross-national discussions on mutual interests in this fishery.

The fishery, more complex than the Icelandic one, came from the combination of different interests and rules (arrangements) in the management plan for operators of both countries. The selection of operative objectives was, therefore, a critical factor which was solved with dialogue and trust among all participants. The stakeholders' main motivation was the opportunity to propose a specific management plan for the crustacean fishery as an alternative to the outdated recovery plan currently in place [68]. Another motivation was to strengthen the collaboration among the Iberian fishers' organizations (PO) in order to influence the market and, consequently, enhance profitability in the fishery.

Transparency is essential to understand stock assessment results, recommended scientific advice and implemented management measures. In fact, stock biomass estimates are concurrently based on both data from the commercial fleets and fishery independent data, the research surveys [69]. The latter are planned to avoid the biases from directed fisheries linked to the selection of the more productive fishing grounds and some undesired practices, e.g. high grading [70]. This reflects the need for a closer and continuous dialogue between scientists and fishers as a way to disseminate and interpret the scientific results. RBM has the potential for ensuring transparency by increasing the interaction with stakeholders in several stages of the process.

> "We have concerns about the data provided by the research vessel that have nothing to do with the reality of fishing. Stock assessments should be made with data obtained from commercial boats with updated equipment, and then compared with those obtained from research vessels (to allow for calibration)"
> (Direct stakeholder, Portuguese fishing association)

Under the RBM framework, all participants agreed to be subject to the same rules in order to ensure a level-playing field when shifting from the current regime. This includes the harvest control rules, but also any activities that fall under national regulations (e.g. a weekly rest or

auction conditions). In this context, the definition of objectives in comprehensive and positive terms (e.g. a minimum catch-per-unit-effort) was key to achieving consensus among stakeholders. These stepwise processes were essential to move towards more challenging objectives.

> "Desire the good and then the optimal. Sometimes desirable objectives are selected and approved without a viability study. It would be like outlawing poverty" (Direct stakeholder, Portuguese management authority)

Sharing information would foster the adaptation to environmental or societal changes, as well as adjusting management strategies or reference points, and ultimately, ensuring long term management plans are put in place.

3.2.3. North Sea mixed demersal bottom trawl fishery

The North Sea case included 225 finfish trawlers managed under TAC and effort quota in ICES Subdivision IVa and IVb. This case embraced associations and organisations that are already working on participative management initiatives. A wide geographical area was combined with a significant number of skippers. The Producers Organizations (POs) were the operators selected for this case study since they are in charge of allocating fishing quotas.

> "Producers Organisations should act as operators instead of the Scottish White Fish Producers Association (SWFPA), as they are already managing quotas for skippers" (Direct stakeholder, Scottish fishing organisation)

Concerns were raised about the difficulty of implementing RBM in the North Sea due to the sheer number of fleets involved from different countries. As for the Icelandic case study, RBM was seen as worthwhile only if it includes a significant number of stakeholders.

> "It was suggested that the management plan could be developed for the whole demersal mixed fishery at the North Sea scale, then adapted specifically at the scale of operators, then fleets, métiers, etc." (Direct stakeholder, Scottish management authority)

Other concerns included the incentives and sanctions associated with RBM. The incentives for joining should be attractive enough, for example by demonstrating the economic benefit for the skippers involved in RBM. Similarly, sanctions should be suitable to ensure compliance.

> "In case of non-compliance, sanctions need to be appropriate and efficient. For instance, reducing the quota of a vessel struggling to reduce discards might worsen the situation rather than improving it" (Direct Stakeholder, Scottish fishing organization)

The science which forms the basis for the management of this fishery is dependent on research surveys and fisheries dependent information (catch data). The latter information has often proven to be an issue: scientists need updated data; fishermen do not always agree with scientific conclusions; and politicians demand comprehensive figures to take evidence-based decisions. RBM could be the opportunity to gather more accurate data to perform better stock assessments and projections that would lead to more confidence in the scientific advice. In this case, direct stakeholders agreed to explore innovative models for data collection, including the reversal of the burden of proof [38].

> "Shifting the burden of proof onto skippers is a major step towards stakeholders' involvement and self-management" (Direct stakeholder, Scottish management authority)

RBM is seen by some stakeholders as a possible solution to implement the soon to be enforced discard ban by providing a more flexible and reactive management system than the one currently in place in the North Sea. The need for processes that identify feasible objectives and

management strategies, avoiding unrealistic situations, was another common aspect highlighted. In addition, transparency was demanded from the operators but also from the other agencies involved (i.e. authority and auditor).

3.2.4. Mediterranean mixed demersal trawl fishery

The Mediterranean Sea is a highly complex social environment with features that create appropriate testing conditions for any system that seeks to manage European fisheries. The Mediterranean case study was mainly focused on Geographical Sub Area (GSA) 17 (i.e. Northern and Central Adriatic Sea). This basin is a microcosm of the entire Mediterranean with common issues (multi-specific and multi-gear fisheries, multinational, shared stocks, enclosed basin, etc.). Bottom trawlers are responsible for a large proportion of the total catches, including very important economic species such as European hake, red mullet, sole, cuttlefish, squids, Norway lobster and mantis shrimp. Fishery production dynamics are based not only on resource availability but are also strongly driven by market demand and prices [71]. The countries involved in the Adriatic fishery (Italy, Croatia and Slovenia) share a common understanding of the poor health of the fish stocks, as well as common socio-economic issues. Furthermore, the urgency for seeking solutions to these problems was paramount for most of the stakeholders involved.

> "Urgency of management measures is high due to the severity of the problems" (Indirect stakeholder, Italian environmental NGO)

> "Italian, Croatian and Slovenian members have to cooperate together in GSA 17 fisheries management, fishes have no passport" (Direct stakeholder, Croatian management authority)

Catch and effort quotas have already been proposed through a bottom-up approach led by local producers' organizations [71–73]; as such this can be considered as a case of results-based management [74]. The combination of: (i) current management measures for the

relevant commercial species [71,75–77] (mainly based on the regulation of fishing effort and, on the definition of minimum catchable sizes); (ii) the implementation of new management measures and; (iii) strong participatory approaches in decision-making processes, were widely accepted.

> "Fishermen feel responsible for changing the situation of the fishery. Preliminary involvement has been felt as useful and much appreciated" (Direct stakeholder, Italian fishing association)

> "It is important to have good dialogue with operators prior to the management plan" (Direct stakeholder, International management authority)

3.3 Survey

The active participation and the high profile of the 38 face-to-face interviews offered a clear vision for understanding how the stakeholders would use and, ultimately, be affected by a results-based approach. Evidence in relation to the policy arena of fisheries management was obtained, assessing the feasibility of policy options as a first step to recommend alternatives and courses of action in Europe.

3.3.1. Analysis of management priorities by stakeholder groups

A total of 20 different topics were proposed to be prioritized in order of importance by each stakeholder interviewed (Table 3). Comparative analysis among the stakeholder groups' perceptions in relation to the weighted average mean of the management priorities scored revealed no significant differences (Figure 2).

INSERT FIGURE 2

Authorities were concerned with enforcement and control, and all stakeholders rated the importance of the biological and environmental issues. The ranking of priorities identified the main preferences for fisheries management within each stakeholders group (Figure 3).

> "Very few objectives are directly measurable and controllable by the operators. The system has to take care of uncertainties, clearly defining to what extent you can be responsible as an operator" (Direct stakeholder, United Kingdom fishing organization)

> "You must consider the MSY and the discard ban in order to implement a management plan (and not much else)" (Indirect stakeholder, Danish advisory organization)

INSERT TABLE 6

INSERT FIGURE 3

3.3.2. Selection of appropriate management agencies

A comprehensive step was carried out towards understanding stakeholder's roles by first "unbundling" them into "rights", "responsibilities" and "benefits", and then assessing the "relationship" between them [60]. A total of 32 stakeholders were asked to identify their perceptions of the agencies involved in managing European fisheries (Figure 4). This allowed for the identification of the appropriate institutions to perform the role of authority, operator and auditor in a RFMS scenario and the interactions between stakeholders regarding fisheries' use. The outcomes serve to strengthen the current institutional design [78], reducing possible conflicts of new proposals in advance (Table 7), and suggesting the National Governments, DG-Mare and the fishing industry (i.e. direct stakeholders) as the most appropriate agencies for managing European fisheries.

INSERT TABLE 7

INSERT FIGURE 4

3.3.3. Determination of the appropriate management approach

The newly reformed CFP proposes some alternative management arrangements (e.g. different quota allocations based on fixed or transferable fishing concessions) that strengthen flexibility and predictable long-term scenarios. Once again, with the philosophy of sharing and applying expert knowledge, stakeholders were questioned about the best management approach to be implemented in Europe (see Table 4). There was a clear tendency among stakeholders to favour "co-management by partnership" for European fisheries (Figure 5). However, they expressed their concerns with regard to the selection of a unique approach for Europe, admitting a case-dependent preference and keeping the door open for innovative systems.

> "There are conflicts among the fixed objectives of a given management system. On the one hand, fixed objectives relate to environmental and conservation improvements (that will lower fisheries profitability) and, on the other hand, managers want to maximize fishing profits. The best approach has to focus on specific situations. To do so, researchers and managers ought to give fishermen different options and tools in order to select and manage themselves in the best way" (Indirect stakeholder, Danish advisory organization)

INSERT FIGURE 5

4. Discussion

The stakeholders' diagnosis of the current management system is consistent with previous research and consultative process' findings [12,22]. In order to tackle drawbacks in the CFP and

to address on-going challenges, stakeholders preferred a partnership approach to co-management over other proposed approaches for managing the European fisheries.

Should we, therefore, conclude that Europe is not ready for results-based approach in management? The answer is no. The reasons behind the stakeholders‘ preference for a co-management approach are framed in an explicit demand for increased involvement, including for longer term decision-making processes [79–81]. Basically, stakeholders are familiar with the “co-management” concept, already in place in several European fisheries; and it is perceived as a more feasible and even legitimate system. The “co-management by partnership“ approach has a broader definition than the other management approaches, where roles and responsibilities among actors in the fishery seemed to be more constrained. Therefore, stakeholders found it easier to fit their interests and values within this wide approach.

Furthermore, stakeholders did not reject a results-based approach. Most of them supported the concepts as reasonable; however, practical requirements in terms of commitment, resources available and organisational capacities made them perceive it as less applicable. Particularly, barriers for acceptance were related to two topics: accountability and management cost. Operational objectives require that operators can meaningfully be made responsible for achieving them and to collect information supporting an audit of the extent to which they are achieved. In practice, stakeholders considered that it may prove difficult to define objectives with sufficient relevance and quality in these aspects. Besides definition of goals, trade-offs [82] require interactive combination where stakeholders adjust the balances of such trade-offs to specific situations. In this sense, the reformed CFP enables member states to require resource users to contribute proportionally to the management and research budget [9].

Building on a stepwise process, the viability of the system could be increased towards self-management scenarios. Transitional periods between the current management system and

the implementation of the results-based approach would be needed. As an incentive-based system, there is a 'carrot and stick' issue over the switch from a top down management system to a (bottom up) results-based management system. It could be said that current system comprises sticks (sanctions, e.g. fines or quota reductions) if management targets are not being achieved, but little in the way of carrots (incentives, e.g. additional days-at-sea) for achieving targets.

Effectiveness, costs and accuracy of enforcement emerge as critical issues. The existing authorities showed some resistance to losing power and control, while the fishing sector expressed concerns about the accountability implications, and environmental NGOs emphasized the need for close audit of the system that answers the "did they do it?" question [83]. On the other hand, many stakeholders agreed on several positive aspects. For instance, creating an international Producer Organization for sharing efforts in market-based alternatives and obtaining updated information for research [58]; jointly and iteratively developing management plans for a fishery that break the relative isolation of science from management and from the fishing industry. Finally, the lack of trust among stakeholders, critical for any management system [35,84], is specifically addressed within participative approaches such as the results-based approach (e.g. joint development of the management plans generates trust among operators).

In order to avoiding panaceas that have previously harmed natural resource management [85], the advance towards implementing results-based initiatives might aim to provide a voluntary alternative: i.e. a gradual shift of management towards the resource users, providing evidence of the benefits of the change through a transparent and participative process. If the voice of European stakeholders speaks of the system feasibility and implications, the promotion of more pilot studies should provide evidence-based alternatives for further improvements in management, ultimately achieving environmental and socio-economic sustainability.

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Figure

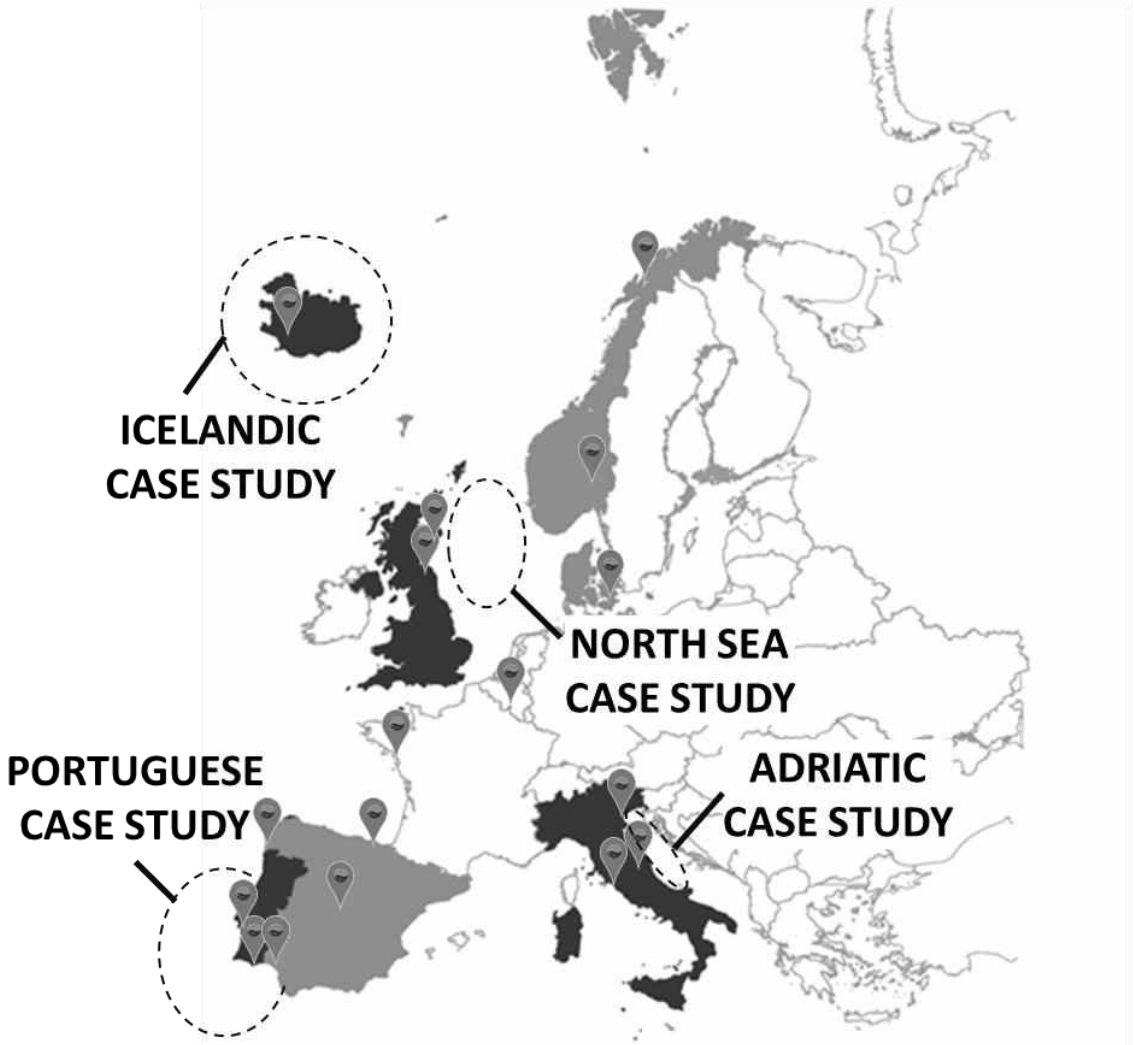


Figure 1. Map of stakeholders' interactions and case studies. In black, the countries that lead the four case studies; in grey, the other countries involved. The arrows indicate the precise location of the interactions.

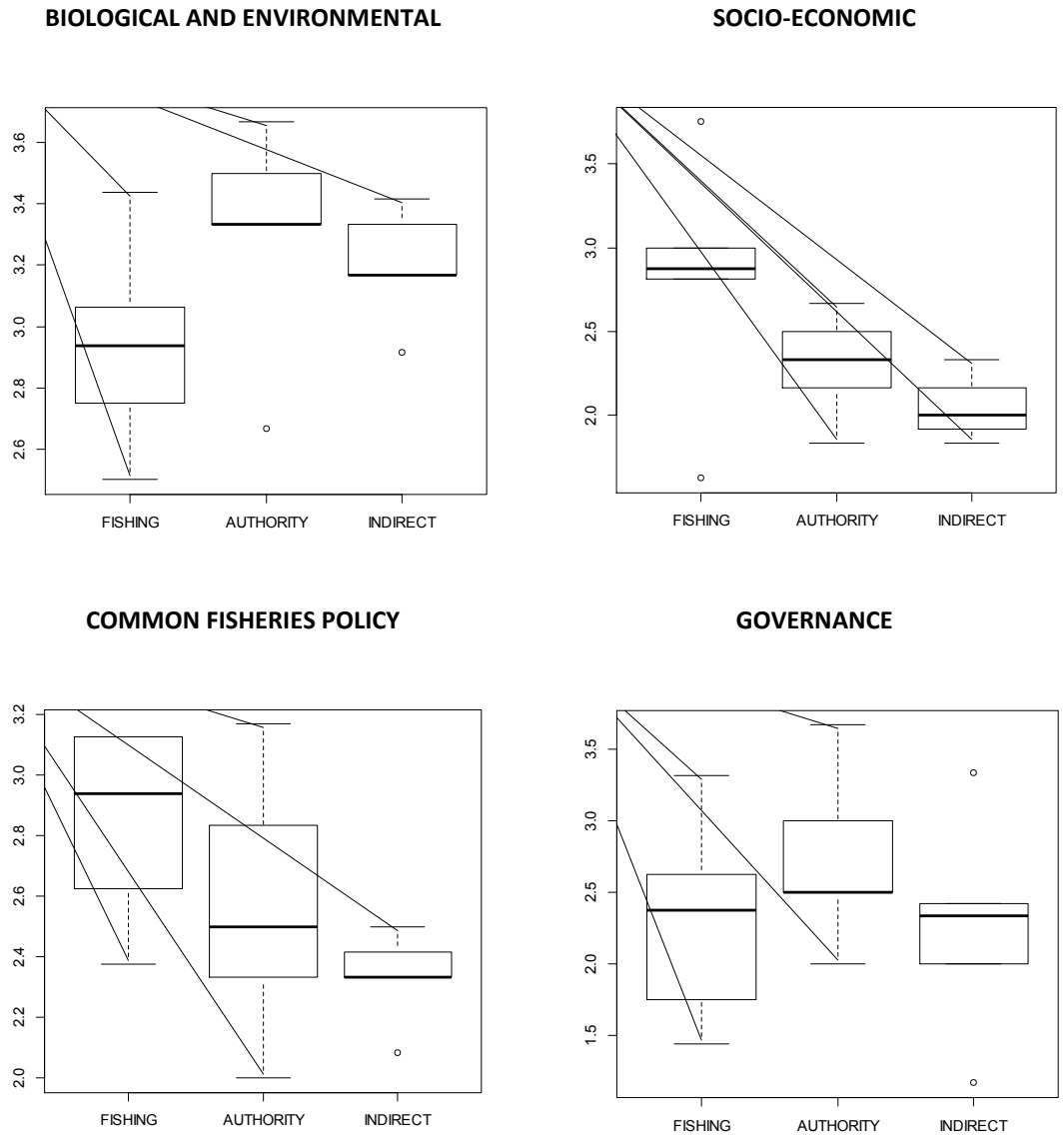


Figure 2. Management priorities scored by the stakeholder groups. Total number of stakeholders involved (n)=34. Direct Stakeholders (Fishing, n=16, Authorities n=6), and indirect Stakeholders (n=12). Vertical axis: importance of management priorities [1: low; 2: normal; 3: high; 4: very high]

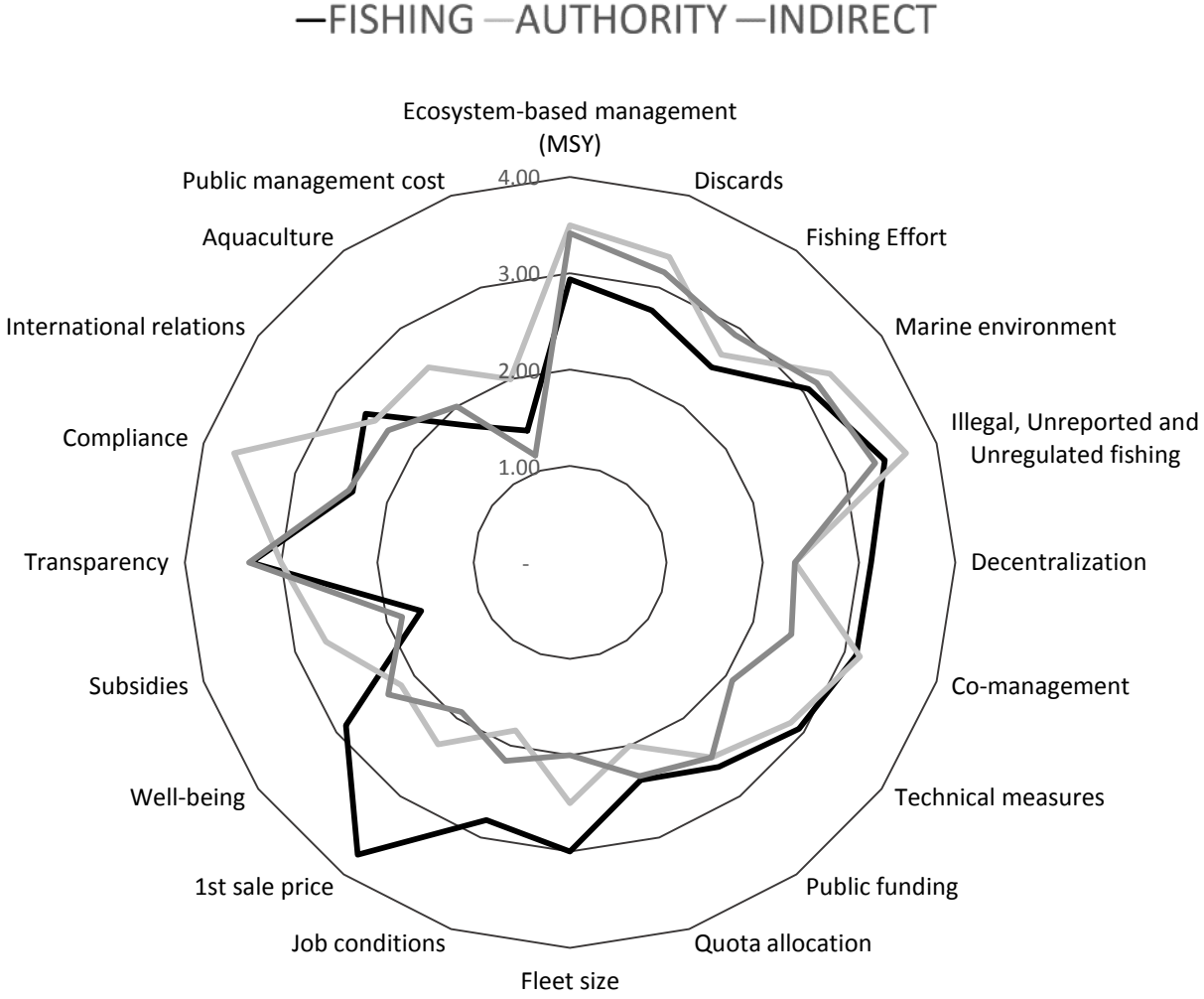
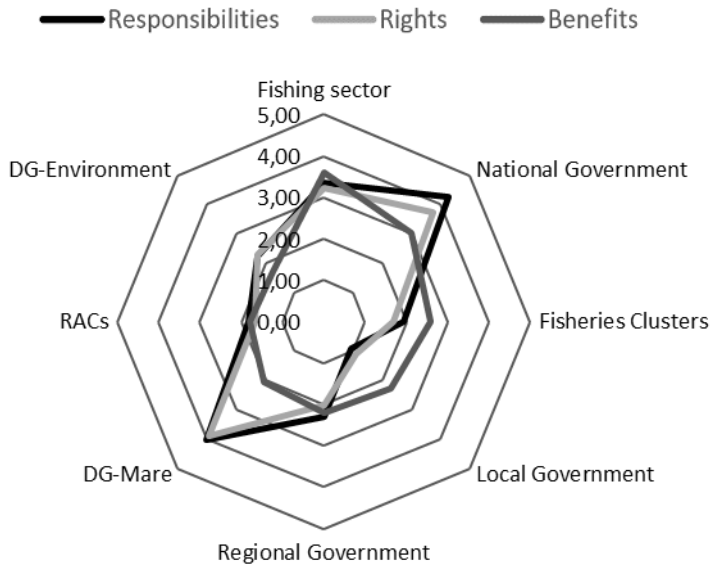


Figure 3. Management Priorities for European fisheries for the three types of stakeholder groups (see Table 1 for examples; total number of stakeholders involved (n)=34). Direct Stakeholders (Fishing, in black, n=16; authorities, light grey, n=6), and indirect Stakeholders (dark grey, n=12). [1: low; 2: normal; 3: high; 4: very high].



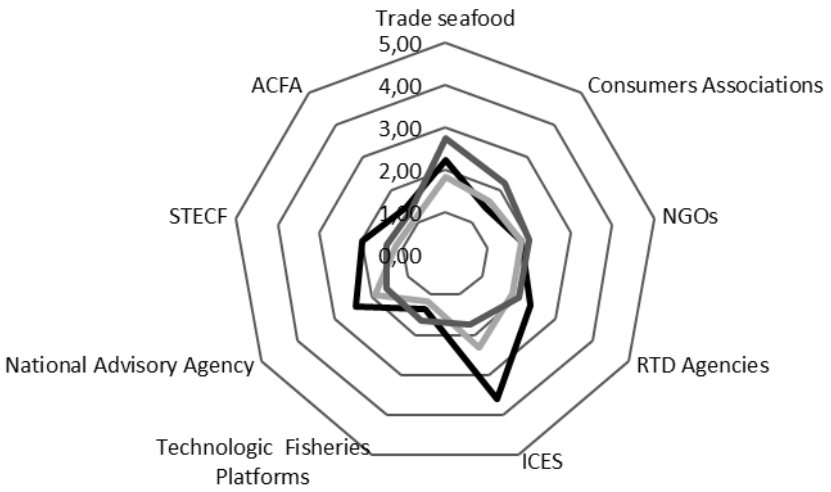


Figure 4. Responsibilities, rights and benefits of the main EU institutions for managing fisheries. (number of stakeholders involved (n)=32). Direct Stakeholders: fishing (n=16) and authorities (n=6); indirect Stakeholders (n=10). [1: none; 2: low; 3: normal; 4: high; 5: very high]. RACs: Regional Advisory Councils; ACFA: Advisory Committee on Fisheries and Aquaculture; STEFC: The Scientific, Technical and Economic Committee for Fisheries; RTD Agencies: Research and Technological Development Agencies; ICES: The International Council for the Exploration of the Sea.

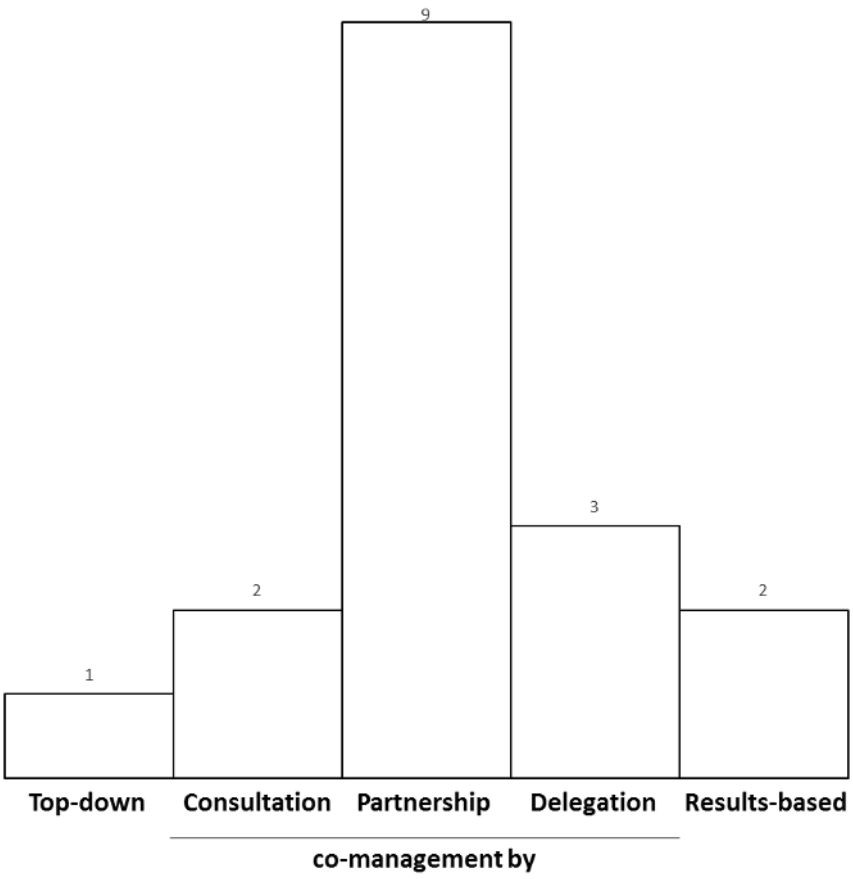


Figure 5. Perceptions of the management approach for European fisheries (number of stakeholder involved (n)=17). Direct Stakeholder; fishing (n=10) and authorities (n=2), and indirect Stakeholders (n=5). See Table 6 for further explanations on the ranked approaches. Ranked options are according to Table 6, i.e. Top-down: Top-down hierarchical management by state; Consultation: co-management by consultation; Partnership: co-management by partnership; Delegation: co-management by delegation; Results-based: Results-based management approach.

Table 1. List of the 54 direct and indirect key stakeholders.

KEY DIRECT STAKEHOLDERS	Fishing Sector	1. Association of Portuguese Industrial Fishing Shipowners (PT) 2. Barlapescas – Cooperative of Barlavento Shipowners (PT) 3. Cornish Fish Producers Organization (UK) 4. Federcoopesca (IT) 5. Federpesca (IT) 6. Fisheries League (IT) 7. Fishermen's Sales Organization (NO) 8. Fishers Organisations (NO) 9. Fishing vessels Owners Association (NO) 10. Iceland Fishing Vessel Owners Federation (IS) 11. Italian Producers Organization (FEDEROP) 12. National Association of Small Boat Owners (IS) 13. National Federation of Fishermen Organization (UK) 14. National Federation of Fishermen's Organisations (UK) 15. Norway Seafood (NO) 16. Olhãopesca – Algarve Fish Producers Organization (PT) 17. Organization of Large-scale Fishing Producers from Ondárroa Port (SP) 18. Producers Organization 07 - Lugo (SP) 19. Scottish Fishermen's Federation (UK) 20. Shipowners of Ayamonte (SP) 21. Shipowners of Vigo (SP) 22. Young's Seafood Company (UK)
	Management Authorities	23. Advisor to Icelandic Ministry of fisheries (IS) 24. Directorate-General for Maritime Affairs and Fisheries (EU) 25. Directorate-General for the Environment (EU) 26. Food and Agriculture Organization of the United Nations (INTERNATIONAL) 27. General Directorate of Natural Resources, Security and Maritime Services (PT) 28. General Fisheries Commission for the Mediterranean (INTERNATIONAL) 29. Icelandic Directorate of Fisheries (IC) 30. Italian Ministry of Agriculture Policy, Food and Forest (IT) 31. Marche Region (IT) 32. Marine Scotland (UK) 33. Norwegian Directorate of Fisheries (NO) 34. Norwegian Ministry of Fisheries (NO) 35. Spanish Ministry of Agriculture, Food and Environment (SP)
KEY INDIRECT STAKEHOLDERS		36. Baltic Sea Regional Advisory Council (EU) 37. Croatian Fishermen Association (HR) 38. European Fisheries Technology Platform (EU) 39. Icelandic Consumer (IS) 40. Institute of Marine Research (NW) 41. International Council for the Exploration of the Sea (DK) 42. International Union for Conservation of Nature (INTERNATIONAL) 43. Mar Algarve (PT) 44. Marine Conservation Society (UK) 45. Marine Stewardship Council (UK) 46. North Sea Regional Advisory Council (EU) 47. OCEANA (EU) 48. Pong-Pesca – Platform of Portuguese NGOs on Fisheries (PT) 49. Portuguese Institute of the Sea and Atmosphere (PT) 50. Research Institute on Fisheries and Aquaculture Economy (IT) 51. Scientific, Technical and Economic Committee on Fisheries (EU) 52. South Western Waters Regional Advisory Council (EU) 53. University of Tromso (NO) 54. World Wide Fund for Nature (SP)

Table 2. Interactions with stakeholders.

Type of interaction	Scope	Techniques and tools applied	Themes and categories addressed
International Workshops (n*=69)	European level, meetings held in: - Copenhagen (n=11) - Edinburgh (n=17) - Ancona (n=22) - Brussels (n=19)	- Round tables - Discussion rounds - Focus group - Brainstorming - Prioritizing and voting	- Current situation of European fisheries management. - The results-based and self-management approach. - Process and procedures for decision-making - Single, multinational and mixed-fisheries. - Documentation and monitoring issues. - Reversing the burden of proof. - Discards and By-catch. - Constraints in the legislative framework to implement RFMS.
Case Study (n=64)	Iceland: ICES Division Va (n=5) Portugal: ICES Subdivision IXa (n=25) North Sea: ICES Subdivision IVa and IVb (n=6) Northern Adriatic Sea: GFCM GSA17** area (n=28)	- Focus and discussion groups - Brainstorming - Prioritizing - Reporting - Role play	- Lumpfish fishery and Icelandic demersal mixed fishery. Icelandic fleet. - Portuguese crustacean bottom trawl fishery. Portuguese and Spanish fleets. - North Sea mixed demersal bottom trawl fishery. Scottish fleet. - Mediterranean mixed demersal trawl fishery. Italian and Croatian fleets.
Survey (n=38)	European/International*** (n=7), Iceland (n=5), Italy (n=4), Norway (n=8), Portugal (n=8), Spain (n=4), United Kingdom (n=2).	- Face-to-face interviews (30 - 120 min.) - Prioritizing	- The agencies involved in fisheries decision-making and performance - Interactions among actors involved - Participative management approach - Socio-economic description and management priorities

* Number of stakeholders involved

** GSA: Geographical Sub-Areas, General Fisheries Commission for the Mediterranean

*** Public or private institutions at multinational level, e.g. the South Western Regional Advisory Council (SWWRAC), DG-Mare, International Union for Conservation of Nature (IUCN), etc.

Table 3. Groups of management priorities ranked by the stakeholders.

BIOLOGICAL AND ENVIRONMENTAL	- Ecosystem management approach based on maximum sustainable yield. - Discards management. - The maximum fishing effort level. - Improvements in marine environment. - Fighting against the Illegal, Unreported and Unregulated fishing.
SOCIO-ECONOMIC	- Fleet size, in terms of employment and/or number of vessels. - Job conditions, e.g. hours of work, resting days, medical treatment on board. - Decreasing subsidies. - First sale price of seafood. - Development of fisheries communities' welfare.
COMMON FISHERIES POLICY	- Decentralization of fisheries management. - Advances in co-management, i.e. increase of participation. - Technical measures of the fishing activities. - The European Fisheries Fund. - Review of the current quota allocation system.
GOVERNANCE	- Increase transparency and information availability. - Improvements in compliance. - International Relations and Fisheries partnership agreements. - Decreasing public cost in fisheries management. - Development of aquaculture.

Table 4. Proposed management approaches used during face-to-face interviews to define stakeholders' preferences.

TOP-DOWN HIERARCHICAL MANAGEMENT BY THE STATE	Where mechanisms for dialogue with users and stakeholders might exist, but only minimal exchange of information takes place and EU/National governments decide what information to share.
CO-MANAGEMENT BY CONSULTATION	Where extensive formal mechanisms for consultation (and feedback on use of recommendations) with users and stakeholders exist, but all decisions are taken by EU/National governments.
CO-MANAGEMENT BY PARTNERSHIP	Where EU/national governments, users, and stakeholders cooperate as decision-making partners in various aspects of management.
CO-MANAGEMENT BY DELEGATION	Where EU/national governments have devolved de facto decision-making power to users and stakeholders in relation to various aspects of fisheries management
RESULTS-BASED MANAGEMENT	Defining an acceptable impact and leaving it to resource users to identify the means to meet the requirements and to document the effectiveness of the means, and ultimately achieve the requirements.

Source: [46,64]

Table 5. SWOT analysis to use a results-based approach for managing European fisheries.

STRENGTHS

AGENTS		
AUTHORITY	**OPERATOR**	**AUDITOR**
Supports regional approaches	Increase of participation	Standardized assessment
Cost reduction	Proactive approach	
Long-term stability		
Applicable within the current legal framework		
Transparency		
Definition of concrete and achievable objectives		
Adaptive and responsive		

OPPORTUNITIES

AGENTS		
AUTHORITY	**OPERATOR**	**AUDITOR**
Accountability	Cost-recovery	Growth of independence
Optimization within nested management system		
Transition periods to increase the acceptability		
Addressing explicit trade-offs		
Reversing the burden of proof		

WEAKNESSES

AUTHORITY	**OPERATOR**	**AUDITOR**
Risk of micromanagement	Cost-effective system	Lack of Independence of the potential candidates
Under-performance of control and enforcement		

THREATS

AUTHORITY	**OPERATOR**	**AUDITOR**
The relative stability principle of the CFP	Ability to control the objectives	Lack of certification schemes
Integration within other marine directives		
Uncertainty in simulations and advices		

Table 6. Top five priorities for the fisheries management system ranked in a scale of importance by each stakeholders' groups (number of stakeholder involved (n)= 34). [1: low; 2: normal; 3: high; 4: very high].

	DIRECT (n=12)		INDIRECT (n=12)
	Fishing Sector (n=16)	**Authority (n=6)**	
1º	First sale prize *(3.8)*	IUU *(3.7)*	EBM with MSY *(3.4)*
2º	IUU* *(3.4)*	Compliance *(3.7)*	IUU *(3.3)*
3º	Transparency *(3.3)*	EBM** with MSY *(3.5)*	Transparency *(3.3)*
4º	Co-management *(3.1)*	Marine environment *(3.3)*	Marine environment *(3.2)*
5º	Decentralization *(3.1)*	Discards *(3.3)*	Discards *(3.2)*

* Illegal, unreported and unregulated (IUU) fishing.
** Ecosystem-based management (EBM).

Table 7. Top five Institutions with responsibilities, rights, and benefits for managing the European fisheries ranked in a scale of importance by each stakeholders' groups (number of stakeholders involved (n)= 32). [1: None; 2: low; 3: normal; 4: high; 5: very high].

Rank	RESPONSIBILITIES	RIGHTS	BENEFITS
1º	National Government *(4.26)*	DG-MARE *(3.91)*	Fishing sector *(3.61)*
2º	DG-MARE *(4.04)*	National Government *(3.72)*	National government *(3.02)*
3º	ICES *(3.60)*	Fishing sector *(3.22)*	Trade seafood *(2.75)*
4º	Fishing sector *(3.37)*	ICES *(2.32)*	Fisheries clusters *(2.60)*
5º	National Advisory Agency *(2.42)*	DG-Environment *(2.28)*	Local Government *(2.29)*