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Benchmarking for data-limited fishery systems to support collaborative focus on solutions

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ABSTRACT

Stakeholder participation is a key feature in risk-based frameworks used to assess and promote sustainable exploitation in fishery systems, but participants usually have a limited opportunity to influence the scope and rules of interaction. Here, an extension of this approach of stakeholder engagement is described and tested in a context where the scope and rules of interaction are decided by the participants themselves. Demonstration is based on a deep-water long-line fishery for black scabbardfish (*Aphanopus carbo*) off mainland Portugal. Managers, scientists and fishery representatives were invited to interact within a facilitated environment with the aim of improving understanding of main problems in the system and of negotiating solutions meaningful to all participants. Mismatches between the scale of biological processes and those at which exploitation is assessed and managed across the Northeast Atlantic and other weaknesses of the fishery system were rapidly identified during an interactive workshop of benchmarking against the Marine Stewardship Council sustainability standard. Specific proposals for action were iteratively developed within the group and evaluated in terms of perceived cost and scope for action. Finally, problems were prioritized in terms of a cumulative score of gravity of anticipated impact, urgency of action and likely degradation rate during a period of inaction to highlight issues most likely to be resolved by the group. The stage-wise approach presented here can be replicated to create or to revise strategies for resolving problems in data-limited fisheries and can be extended to incorporate other critical stakeholders and other tools to stimulate group interaction and joint deliberation.

1. Introduction

Integrated assessments of fishery systems are becoming more popular and diverse, as managers, stakeholders, and consumers question the sustainability and effectiveness of a wide range of operations related to fisheries exploitation and management. These integrated assessments go beyond the traditional single-species stock assessments, by considering the natural environment where the fishery operates, the institutional arrangements of the management system, and, in some cases, the social and economic consequences of fishing. Such methodologies have been developed by public authorities (scientists or regulators) and private entities (environmental groups or certification and ecolabelling organizations). Integrated assessments developed by the public sector usually aim to expand the scope of management and improve planning (Fletcher, 2005; Levin et al., 2009). When these appear through private initiatives, they are targeted towards the market and the consumers in the form of seafood guides or certification and ecolabelling schemes with sustainability standards (Parkes et al., 2011). The information needs and evaluation rigor of such schemes vary according to the scope and objectives of the methods used and their effectiveness in delivering credible sustainability assessments (Leadbitter and Ward, 2007).

Abbreviations: BSF, black scabbardfish, *Aphanopus carbo*; CECAF, Fishery Committee for the Eastern Central Atlantic; CPUE, catch per unit effort; DGRM, central administration, Direcção Geral de Recursos Naturais, Segurança e Serviços Marítimos; *GUT*, gravity, urgency, and tendency; ICES, International Council for the Exploration of the Sea; MSC, Marine Stewardship Council; NGO, non-governmental organization; PO, producers' organization; RAC.S, EU Regional Advisory Council for southern waters; TAC, total allowable catch; WGDEEP, ICES working group on biology and assessment of deep sea fisheries resources.

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Whatever the fishery system under scrutiny, any rigorous integrated assessment methodology faces data deficiencies at some stage of its evaluation process (Fletcher and Bianchi, 2014). The situation is exacerbated in data-limited fisheries often present in regions of high ecological value and elevated conservation risk (Worm and Branch, 2012). To cope with such deficiencies, methods have been developed to adopt risk-based frameworks under low or variable levels of information (Fletcher, 2005; Astles et al., 2006; Patrick et al., 2010). In these cases, stakeholder participation is a central feature, critical to expanding the range of inputs during the identification and rating of risks and to increasing the understanding and uptake of results.

Despite the benefits that stakeholders bring to the quality, transparency and uptake of the process (Fletcher, 2005), existing frameworks make a distinction between participants (who provide information, opinions, or reviews) and promoters (who determine scope and rules, and control outputs) of the engagement process. Here, we propose a simple method of facilitated stakeholder interaction where the scope and rules of engagement are fully determined by the participants. The approach relies on the premise that co-generation of knowledge and focusing on solutions are powerful means of engagement, increase constructive influence in decision-making and promote change (Gawne et al., 2010). The method can be applied by stages in data-limited situations to:

- benchmark fishery systems against a sustainability standard;
- translate perceived weaknesses into proposals for action;
- prioritize problems by evaluating solution constraints (related to time or cost, for example).

The format of the interaction has similarities with strategy workshops for business organizations and requires a facilitator who actively intervenes to potentiate group performance and guarantee conclusions (Montibeller and Franco, 2010). The deep-water longline fishery targeting the black scabbardfish (*Aphanopus carbo*) in mainland Portugal (Bordalo-Machado and Figueiredo, 2009), organized within a specific Producers' Organization structure (Karadzic et al., 2013) and operating within the context of European deepwater fisheries management (Large et al., 2013), is used to illustrate the method.

2. Material and methods

2.1. Proposed methodology

The method consists of four consecutive stages of structured interaction among fishery representatives, scientists and managers (hereafter the interaction group). These stages comprise interaction scoping, system benchmarking, problem translation and solution prioritization (Fig. 1). The interaction group must be composed of people with knowledge and experience of the fishery under consideration. The interaction is guided by a facilitator that helps the group participants to engage, jointly deliberate and reach conclusions at each stage.

2.1.1. Interaction scoping

The objective in the first stage is to guarantee an understanding of the process and its stage-wise progression, and to create conditions for the group to agree to work together towards specific outputs. The facilitator introduces the methodology, its stages and its potential exit points, and participants jointly decide the extent of the interaction, its outputs and its rules of engagement (types of inputs and outputs, confidentiality issues, additional participation, etc.). The stage concludes with a decision on whether to move forward, depending on the willingness to reach agreement.

2.1.2. System benchmarking

Once there is agreement on the scope and rules, interaction proceeds to the fishery benchmarking stage. At this stage, the objective is to use the experience and knowledge of all participants to identify the main sustainability threats to the fishery system. Benchmarking is performed against the Marine Stewardship Council (MSC) standard, a certification framework highly ranked among integrated assessment methodologies (Leadbitter and Ward, 2007; Parkes et al., 2011). The MSC fishery standard sets out the following Principles:

1. fishing practices do not compromise reproductive capacity, avoid overfishing and ensure rebuilding of stocks currently below target abundance (seven performance indicators);
2. fishing operations maintain the structure, functional diversity and productivity of associated ecosystems (fifteen performance indicators); and
3. management systems respect national and international fisheries laws and standards and can effectively deliver the outcomes of Principles 1 and 2 (nine performance indicators).

The 31 performance indicators (PIs) are discussed and scored by the interaction group following the guidelines and scoring thresholds of the MSC standard, according to the rationale established in the recently developed benchmarking and tracking tool of the MSC (MSC, 2014). The role of the facilitator at this stage is to provide a succinct description of each PI and guide the group discussion to distinguish and grade PIs with sustainability concerns (from serious concerns for PIs likely to score <60 in the MSC standard to no concern for those likely to score >80). This evaluation is independent of any intention to submit the fishery system to an MSC certification candidature. Following the convergence in the scoring decisions, the stage concludes with an output (benchmarking report).

2.1.3. Problem translation

Having agreed to go beyond the system benchmarking phase, this stage proceeds to a more detailed problem characterization and decomposition to translate deficiencies into solutions. Although in typical interactive workshops the facilitator is seen as an impartial coordinator (Pavelin et al., 2014), here the facilitator also participates actively and steers the process towards narrowing the range of options without conditioning group decision (honest brokering—Pielke, 2007). The stage concludes with a decision on whether to move forward, depending on the willingness to reach a common understanding of the nature of the main problems and their causal factors.

2.1.4. Solution prioritization

At the final stage, solution pathways are consolidated into concrete actions and action prioritization is performed using a *GUT* priority matrix. *GUT* belongs to the category of quality tools extensively used in industry to assist the generation of ideas, definition of the most important problems, building an understanding of processes, and supporting decision making (de Souza, 2010). The *GUT* score for problem prioritization is obtained from the product of the scores evaluated for three variables: gravity, urgency and tendency (Table 1). Gravity reflects the harm level if an issue remains unresolved (here the consequence of a failure to comply with an MSC performance indicator). Tendency reflects problem progression (here the anticipated degradation rate for an issue flagged by a MSC performance indicator). Urgency reflects the plausibility of solution implementation, and is scored with respect to the likely constraints to action (e.g. the time or cost necessary). In this application, urgency is determined as a function of solution cost (urgency increasing with decreasing cost) and scope for group