



# Co-managing public research in Australian fisheries through convergence–divergence processes



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## ARTICLE INFO

### Article history:

Received 9 February 2015

Received in revised form

4 July 2015

Accepted 5 July 2015

### Keywords:

Participatory research

Co-management

Ecosystem-based approach

Convergence

Divergence

Innovation

Australia

## ABSTRACT

The participation of the industry in public research has been found essential to stimulate innovation in fisheries, but the actual design and implementation of co-management of fisheries research is still a critical and open topic. Based on the evidence of 35 project cases in Australian fisheries, this paper analyses a convergence–divergence process to support participatory research. The analysis first entails a description of the levels of stakeholders involved and the resources allocated at each step of the research process. This leads to a discussion on the impacts of the research process at different stages depending on how different sections of the industry (constituencies) were engaged. The results show that allocating time, resources and opportunities for industry representatives to engage with their constituencies is a crucial divergence phase of research processes that complements multi-stakeholder deliberations in convergence phases. Consequently, this paper contributes to the debate on research co-management processes by discussing the role of iterative knowledge sharing among stakeholders at multiple levels (e.g. fishers, processing industry, fishery associations and policymakers) in fisheries systems.

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## 1. Introduction

There is now ample evidence that public research is more likely to support innovations that create economic, environmental or social value when private stakeholders are involved in the co-management of research processes [38,56]. *Public research* usually refers to government-funded research, although private research institutes may also undertake it with public support [15,23], and industry players and relevant associations may also share research costs [41]. In a business setting in the fisheries sector, *innovations* concern the adoption of new technologies and processes to optimize production processes (e.g. novel fishing techniques, product processing techniques, aquaculture systems), new products for customers (e.g. seafood products with novel nutritional properties or preparations) and new business models (e.g. novel marketing arrangements, procurement channels and revenue streams). *Co-management* occurs when stakeholders involved in the research process participate in the knowledge-sharing (e.g. giving input in the set-up and execution of research) and the decision-making process (e.g. priority setting) [26,29]. Taking a multi-stakeholder and participatory approach to research helps resolve cultural

issues that constrain communication among stakeholders [27,35], enhancing the contribution of research to policy formulation and innovation [43,50,56].

The shift to co-management of public research connects with the ecosystem-based approach to governing fisheries. According to many, public institutions – such as national and international agencies regulating the exploitation of marine resources and the activities of those who exploit them – co-manage fisheries more effectively when they take into account that these are embedded in complex ecological, social and political ecosystems from global to local level [33,36]. Therefore, institutions succeed in supporting innovation in fisheries [43] when they connect knowledge sharing and decision making to multiple levels of stakeholders, from global to local (e.g. fishery and industry associations and their constituencies, environmental organizations and their participants), and vice versa [3,19] – thus allowing different types of stakeholder knowledge to shape innovation (e.g. [34,37,47]). Large projects that follow an ecosystem-based approach and implement a co-management approach to research include, for example, the GAP2 project in the European context [1].

Despite the wide agreement that stimulating innovation in fisheries requires co-management of public research in connection with an ecosystem-based approach, challenges remain in the actual design and implementation of participatory research: engaging research project participants and their stakeholders at the appropriate time; creating consensus and trust among multiple stakeholders'

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perspectives and interests; and synchronizing stakeholders' decisions on a common time horizon [29,31,53]. These challenges also play out when public research aims to support innovations in marketing (i.e. to conduct surveys and test new products that support the industry in finding or creating new markets for fish and seafood products) and post-harvest operations (i.e. to test technologies that support the industry in optimizing fish and seafood storage, transport or processing operations) [13]. In comparison with research supporting technological innovation in marine catch and aquaculture production (e.g. boat and net improvements, fish juvenile breeding), research supporting innovations in marketing and post-harvest operations may be particularly uncertain in their outcomes and impacts [22,42], since these depend on complex social systems linking the fisheries with their buyers, final consumers and society [20,24]. Although it is challenging to put them into practice, these innovations stimulate the competitiveness and the profitability of the fisheries industry, and the survival of small-scale commercial fishers, thus with important implications for their income generation and livelihoods.

In view of these implementation challenges, a knowledge gap still remains as to *how* to design and undertake processes in public research that take into account the complexity of social systems, specifically the multiple levels of actors participating or influencing the research. There has been much focus on governance frameworks for large ecosystems, including both natural systems and aquaculture systems embedded within a natural environment [2,34,37,9]. Nonetheless, it remains unclear how industry constituencies can participate in practice in co-managing public research and contribute to shaping its innovation outcomes, as there appears to be still limited research on this in the fisheries domain (exceptions include [31,35,48]). Four open-process-related questions still need to be answered: With what *multiple levels* in the ecosystem (e.g. fishers, processing industry, and policymakers) does public research need to be linked? What are the *necessary steps* that participatory research projects must take to develop effective feedback loops from the various levels in the system to enhance innovation? Which *resources* do participatory research projects and stakeholders have to allocate to facilitate communication at multiple levels and at different steps? Which *impacts* of participatory research emerge as outcomes of this multi-level interaction among stakeholders?

To address this knowledge gap, this study analyses the experience of 35 marketing and post-harvest research projects that the Australian Seafood Cooperative Research Centre (CRC) co-managed with a multi-stakeholder research network – including academics, industry representatives and government officials – between 2007 and 2012. The selected research projects differ widely in the target species and their respective industries, as well as in the number and configuration of the stakeholders involved and their history, thus making each case unique. Despite these differences, this study finds that projects that involved iterative phases of convergence and divergence among the multiple levels of stakeholders (or, in other words, *convergence–divergence processes*) more effectively supported industry innovations than projects that did not have such involvement. In the more successful projects, convergence phases involved knowledge sharing and decision making among stakeholders' representatives that directly participated in public research co-management – including representatives of fishers' associations, processors and companies, researchers and government officials. In divergence phases, the projects provided stakeholder representatives with resources and tasks to bring the shared knowledge and decisions to their constituencies for a separate round of discussion and decision making, thus sharing the voice of multiple levels of stakeholders among one another over time. Thus, this research uses recent cases from the Australian Seafood CRC experience to illustrate how processes

of convergence–divergence are planned and executed in public research co-management, particularly in contexts where the outcomes of innovations are highly uncertain. The remainder of the paper is structured as follows: **Section 2** sets the background to the Australian fish and seafood sector and the related CRC, and **Section 3** introduces theoretical underpinnings of convergence–divergence processes in research co-management. **Section 4** describes the research methods and the selected cases, followed by the results in **Section 5** and discussion and conclusion in **Section 6**.

## 2. Background: the Australian fish and seafood sector and the cooperative research centre

The Australian fish and seafood sector – including both aquaculture and fisheries – comprises a wide range of species, each one embedded in notably different socio-economic and biological ecosystems. Depending on the economic value attached to each species, fish and seafood subsectors vary significantly in: the structure of their supply chain (from highly fragmented, such as the oyster and shrimp subsectors, to vertically integrated, such as the Southern Bluefin tuna and barramundi subsectors); industry concentration (from a few corporations governing the market to an atomized market of small-scale companies); geographical dispersion (from local to national); the governance structure of their fishery and industry associations (from divided among local and state associations to represented through a national association); market breadth (from local to international) and related global competition [10,40]. These industry differences often intertwine with the heterogeneity of environmental sustainability issues and risks that each species faces given its specific biological conditions (such as the seasonal variations in production and associated yield and profit uncertainty) [16,21]. These differences are crucial to understanding the task complexity that public research organizations face when facilitating networks among industry, academia and communities to support innovations for the benefit of the Australian fish and seafood sector [8,14].

Operating since 2007, the Seafood CRC is an organization that undertakes and disseminates public research on production, post-harvest and marketing throughout the fish and seafood sector through projects co-managed by the Australian Government, universities, industry organizations, fisheries and private companies [17]. It is one of the many Cooperative Research Centers (CRCs) instituted and funded by the Australian Government to enhance collaboration between industry and academia in economic sectors of strategic importance for the country [46,52,55]. With its seven-year plan of investment equal to 140 million Australian dollars (AUD), its goal is to stimulate innovation and the competitiveness of fisheries and their downstream supply chains for the benefit of Australians. The project funding structure illustrates how public research is co-managed in the Seafood CRC. A formal requirement of each Seafood CRC-funded project is that funding has to be provided proportionally by government sources and the industry partners, with the latter contributing at least 33% of the total funding [17]. Industry partners are either large companies or local/state industry and fishery associations. Since co-funding is a formal requirement from the beginning and throughout the project, the promoters of a research idea—usually staff at research institutes or universities, but they could also be industry actors—have to first define its potential value to find industry and government partners willing to co-invest in it. Thus, participants in Seafood CRC projects typically involve co-funding industry partners and government officers, universities or research centers that conduct the project study, as well as Seafood CRC staff facilitating the research process. Once the research is funded, researchers need to keep engaging with the other project

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