



Transboundary research in fisheries

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ARTICLE INFO

Keywords:

Boundary paradox
Fisheries management
Spatial boundaries
Transboundary governance

ABSTRACT

Spatial boundaries have become an indispensable part of regimes and tools for regulating fisheries, with examples including marine protected areas, regional fisheries management organizations and Exclusive Economic Zones. Yet, it is also widely acknowledged that boundaries are a social construct, which may be resisted by both fishers and fish ecology. The ensuing spatial and institutional mismatches have been shown to frustrate management efforts, exacerbating issues of non-compliance and ultimately leading to conflicts and overfishing. Interestingly, the often static and rigid nature of these boundaries has also led to a concomitant research interest in 'transboundary'. This paradoxical situation of more boundary-setting entailing more transboundary thinking warrants a deeper understanding about boundaries and the role of transboundary research in fisheries. The aims of this review article are twofold: (1) a theoretical clarification on the meanings and uses of spatial boundaries drawing on geographical "boundary studies" literature; and (2) a construction of a typology that outlines how transboundary research is being articulated and envisioned. Together, the study reveals that transboundary scholarship in fisheries are mostly related to resources, fleets, trade and governance aspects and that dealing with the "boundary paradox" encompasses re-incorporating, re-scaling and re-imagining of boundaries. This article provides a conceptual basis for reflecting upon boundaries in world's fisheries and opens up discussions for a more nuanced boundary application that can better cope with multi-level interactions and dynamism.

1. Introduction

Spatial boundaries are an indispensable part of the fisheries management system. Numerous legal and administrative schemes exist to define how fisheries are to be partitioned and organized in the world's oceans. Exclusive Economic Zones (EEZs), high-seas designation represented by regional fisheries management organizations (RFMOs), Large Marine Ecosystems (LMEs) and Marine Protected Areas (MPAs) are some of the most prominent examples. The widespread application of spatial boundaries in the oceans and inland waters would not take many people by surprise, however. In fact, the use of boundaries might be largely assumed and even taken for granted. Lidskog et al. [1] argue that spatial boundaries have been instrumental in making complex and fluid environmental problems more governable, as they help draw attention to important manage-

ment issues, anchor those issues to particular administrative-geographical jurisdictions, and ascribe legitimacy and responsibility to relevant actors. States, arguably the most dominant actor in resource management, have been keen proponents of inscribing spatial boundaries, as the boundaries help make intricate local resource patterns and decentralized social practices legible for state functions of taxation, policing and provision of services [2]. What is more, at the sub-state or the community level, the importance of well-defined and enforced bounded space around a group of users and a resource system has been extensively argued for by common-pool resource scholars and fishery economists alike as a precondition for the successful management of fishery resources (see [3–6]). Thus, boundary delimitation has been proliferated in many fields, including fisheries, to enhance the effectiveness of management tasks.

At the same time, it is widely acknowledged that boundaries are

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<http://dx.doi.org/10.1016/j.marpol.2016.10.023>

Received 30 July 2016; Received in revised form 13 October 2016; Accepted 15 October 2016

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inescapably a social construct, which may be neither aligned with nor respected by ecological and human components essential to fishing. The ensuing spatial mismatches between legal-politico-management boundaries on the one hand and ecological or socio-cultural ones generated by fish and fishers on the other have been identified as a significant institutional pitfall and a governability challenge [7–11], frustrating management efforts and posing threats to the health of fish stocks as well as fisher wellbeing. Real-life repercussions include erosion of communities' adaptive capacity and fishing livelihoods due to a reduction or restriction of traditional fishing spaces [12,13], and exacerbation of non-compliance by fishers who are suddenly labeled as poachers or unwanted migrants [14,15]. Other harmful consequences could involve human rights violations such as abduction, arrests or physical assaults in addition to being hostages or “pawns” in larger geopolitical struggles [16,17]. Ecologically, because of the magnified intractability of the enforcement problem, boundary mismatches have been shown to create an added pressure on fish stocks, giving rise to serial overfishing at the regional-global scale as well as localized depletions in border areas [18,19].

The realization that the static spatial boundaries deployed to manage fisheries can be ill-equipped for the fluctuating patterns of the natural and social order has given rise to a set of research efforts focused on dealing with their unintended, but critical, side-effects. For instance, a research tradition of investigating optimal/cooperative arrangements for managing transboundary resources in a multilateral setting (see [20]; also theme 1.2 in Fig. 2) was precipitated by the episode of delineating Extended Fisheries Jurisdiction (EFJ) in the 1970s (and later EEZs). As the term implies, an interest in ‘transboundary’ represents an approach that aims to carefully assess the effects of boundary-setting and provide ways to reconcile or transcend the limitations of static and rigid spatial demarcation for fisheries management. Practical solutions for alleviating the inadvertent shortcomings of spatial boundaries are being sought on several fronts including joint fishing zones or transboundary conservation areas [21], more flexible harvest plans for shared or migratory fish stocks [22], MPA networks linking fragmented small reserves [23] and ‘dynamic ocean management’ based on the integration of real-time data [24]. What this research trend implies is that with installation of spatial boundaries, we are also propelled to engage with *transboundary* flows, connections and cooperation.

The situation of more boundary delineation entailing more transboundary approaches in managing world's fisheries, which we term “boundary paradox”, warrants attention to deeper questions about boundary and transboundary – a topic that has so far eluded academic attention. This article proposes that coming to terms with spatial boundaries and their inherent shortcomings could start from reflecting on the basic notions of what boundaries mean, how they have been used and in what alternative ways they can be conceptualized. What is the broad historical and intellectual current with which to understand the proliferation of boundaries in the ocean and inland waters? What are the varied ways in which spatial boundaries can be envisioned? What are the transboundary responses to the boundary paradox, and more specifically, what is the scope of transboundary fisheries research? In addressing these questions, this article engages in two review activities; it offers (1) a theoretical clarification drawing on a wider “boundary studies” literature, followed by (2) a typology of transboundary scholarship developed through a review of a fisheries literature. The aim is to organize wide-ranging perspectives that exist on transboundary fisheries through a typology, as they pertain to resources, fleets, trade and governance; it thus presents a collective viewpoint on the topic.¹

¹ It must be noted, however, that in attempting these reviews, we leave aside the issues arising from contradictory boundary settings, as in situations of legal pluralism [142]. In such situations, people adhere to different socio-legal perceptions of boundaries and boundary behaviour, creating normative confusion and possibly conflict [53].

In what follows, Section 2.1, first, deconstructs the general concept of a boundary, drawing on pertinent geographical literature. This then guides our narrative on spatial boundaries used in fisheries management (Section 2.2). We subsequently provide a review of relevant fisheries literature in order to outline the thematic extent of transboundary scholarship (Section 3). This was facilitated through an initial brainstorming discussion (Section 3.1) and a construction of an interdisciplinary typology (Sections 3.2–3.5). Section 4 moves on to further conceptualize this body of work as comprising three idealized transboundary responses – re-incorporating, re-scaling and re-imagining. In Section 5, the article concludes with a proposition that gaining insights into the underlying meanings and the wider trend in boundary application could enable alternative discussions for spatially-based fisheries management that are better able to cope with dynamic and multi-scalar interactions.

2. Understanding boundary and transboundary

2.1. Studying boundaries

Boundaries in geography have long been understood as a firm, monolithic feature that helps secure sovereignty and control [25]. This view stems in part from the Westphalian system,² which shifted focus from city states towards governments of larger territorial units. Nation-states became the primary institutional agents asserting territorial integrity and self-determination in a system of inter-state relations [26,27]. In line with this, boundary studies were mainly concerned with international borders that divide the world into a (supposedly) neat mosaic of politico-jurisdictional units. In the early 1960s Minghi [28] assembled eight categories of boundary research: boundaries in disputed areas, effects of boundary change, evolution of boundaries, delimitation process, boundaries involving tiny states, offshore areas and internal division and, finally, boundaries in disputes over natural resources. Although Minghi's categorization, the first of its kind, hinted at the evolution of what is possible of boundary studies, Jones [29] submits that the meaning of boundary in much of the 20th century was still limited to line-in-Cartesian-space founded on a relatively static understanding of political borders.

The early 1990s marked the end of the cold war and the hastening of globalization, which brought with it an infusion of new concepts such as mobility, de/re-territorialization, hybridity, post-modernity and neo-liberalism [25,29]. These developments provided an impetus that began to challenge the apparent fixity that had characterized the boundary discourse. Moving away from the realist position of international relations, nation-states were no longer to be immediately privileged as the unit of analysis. A more critical stance and alternative visions of boundaries were sought to expand the scope of discussion and curb state-centric limitations. Concepts such as “territorial trap”, i.e., the tendency to assume states as rigid containers of societies with uniform spatial identities of internal members [30], and “seeing like a state”, i.e., states' wholesale reliance on abstract and universal geometric boundaries for depicting society with little concern for what lies inside the parcel [2], were made influential to warn about the risky impression of centralized boundary-drawing. Contingent on historical-geographical context, boundaries were increasingly seen as processes, practices, symbols, institutions or networks through which power and control is negotiated rather than simply imposed [25,31,32].

Against this backdrop, the idea of boundaries in boundary studies gained several new dimensions. One of the major shifts was that

² Stemming from the Peace of Westphalia, signed in 1648 to end the European Thirty Years' War, the Westphalian system refers to the Western-originated, “realist”-based international system of states, where each nation state is seen to have sovereignty over its territory and domestic affairs. Subsequently, it champions the principle of legal equality between states as well as the principle of non-intervention in the internal affairs of other states.

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