The integration of social science information into Great Lakes fishery management: Opportunities and challenges

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ABSTRACT

Fishery management is increasingly moving toward management that accounts for environmental and social dimensions. Such an approach requires the integration of natural and social science information into planning and decision-making processes. The actual integration of social science information, however, remains limited in many policy and decision-making processes within fisheries. Our study provides insights into factors that influence the intention to use social science information among fishery managers and the actual integration of such information into fishery management. Based on interviews with fishery managers in the Great Lakes, we find that the lack of social science expertise in fishery management agencies leads to multiple negative beliefs and attitudes, and subsequently a low intention to use social science information in decision-making processes. At the same time, the paper finds that more expertise in decision-making tools and basing social science on equal footing with natural sciences within fishery management institutions appears critical to advance the actual integration of social science information in fishery management.

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1. Introduction

Fisheries worldwide are increasingly managed as social–ecological systems that aim to achieve environmental and socio-economic goals (Hunt et al., 2013). Fishery managers thus need to account not only for biological and ecological considerations of fisheries, but also economic and social ones and the role of governance models to achieve desired goals (Möllmann et al., 2013; Urquhart et al., 2011). Such a management approach requires the integration of information across the natural and social science divide in management and decision-making process of fisheries (Hunt et al., 2013; Coll et al., 2013; Haapasaari et al., 2012). In addition, fisheries management is not only affected by the inherent unpredictability of the resource itself but also by social, economic, and regulatory uncertainties that affect the use of fish resources (Mahon et al., 2008). Social science information is thus critical to improve adaptive capacity of fishery management in order to address these uncertainties (Arlinghaus et al., 2013; Arlinghaus, 2006).

The integration of social science and bio-ecological data in policy and decision-making processes within management agencies,

however, remains limited (Evely et al., 2008). Fishery managers are typically trained in natural sciences. Subsequently, decision-making processes are often based primarily on ecological and biological information (Bunnefeld et al., 2011). Neglecting social dimensions in decision-making processes, however, can be a critical mistake. The success or failure of natural resource management is often determined at least as much by social and institutional factors as ecological ones, especially given that fishery management programs in general aim to manage human behavior (Mascia, 2003; Fulton et al., 2011; Decker et al., 2001). If policies and programs are based on unsubstantiated assumptions about participants and their motivations, in this case fishermen, they are likely to fail (Ostrom, 1999).

The integration of social and ecological science information in the management of complex systems can be challenging due to potential communication differences or disciplinary silos (Heberlein, 1988; Eigenbrode et al., 2007). Combining natural and social science information, for example, typically requires the willingness to work across disciplines and engage with different underlying epistemologies and methods (Fazey et al., 2006; Evely et al., 2008) that might be unfamiliar to fishery managers and decision makers trained in ecology and biology.

Another important point is the recognition of the diversity of social science disciplines. Social sciences, as natural sciences, is an umbrella term that contains a range of sub-disciplines.

Examples of social science disciplines that are of interest in fishery management include economics, anthropology, political science, sociology, psychology, human geography, history, or ethics (Symes and Hoefnagel, 2010; Decker et al., 2001). All of these disciplines provide different insights into fishery relevant topics. Disciplines like economics and psychology often rely on quantitative data collection and analysis approaches. Disciplines such as history, ethics, or political sciences might rely more on qualitative data while human geography can provide spatial insights. Despite this diversity of social science disciplines, social sciences are often equated with qualitative approaches that are perceived as less rigorous than quantitative ones (Lele and Norgaard, 2005). Qualitative approaches, however, can be as rigorous as quantitative ones even though they are at times not perceived as "science" (Lele and Norgaard, 2005). It might be necessary to educate practitioners who are familiar with natural science information such as fishery managers about the diversity of social science disciplines, their underlying approaches (qualitative and quantitative); the rigor and value of qualitative approaches that might be unfamiliar to them. Otherwise, fishery managers might dismiss such data and not integrate it into decision-making processes. Perceptions unfortunately do not change easily and methodological approaches that lie outside of well know disciplines are likely viewed with discomfort, if not outright suspicion (Holling, 1998).

1.1. The Great Lakes fishery

Our study investigates factors that influence the integration of social science information into fishery management in the Great Lakes. The Great Lakes basin consists of five connected lakes (Superior, Huron, Michigan, Erie, and Ontario) that make up the largest surface freshwater system in the world (EPA 2014) (Fig. 1).

The Great Lakes fishery includes commercial, recreational, and tribal fisheries (Gaden et al., 2012). Recreation fishing is dominant in the seven US states in the basin; commercial fishing is the main fishery in Ontario. The management of the fishery across the basin is shared among federal, state, and provincial government agencies, and tribal authorities/First Nations in the US and Canada (Gaden et al., 2012) (Fig. 2).

Contemporary ecological and social changes in the basin that potentially affect Great Lakes fishery include climate change (Cline et al., 2013, 2014), the spread of pathogens and aquatic invasive species by diverse human activities (Bain et al., 2010; Kilian et al., 2012; Kelly et al., 2013), and demographic changes associated with migration and economic patterns (Breffle et al., 2013). Based on the complexity of these social and ecological issues, there is a need to understand human–environment interaction of the Great Lakes fishery. Subsequently, information from both natural and social science should inform decision-making processes to account for ecological and social dimensions that underlie fishery management (Decker et al., 2012). Previous academic studies provide some insights to these issues (e.g. Connelly et al., 1999; Bishop et al., 1987; Connelly and Brown, 2010; Bishop et al., 1990; Milliman et al., 1992; Pejchar and Mooney, 2009; Rothlisberger et al., 2010; Roy et al., 2010). The integration of social science information into management and decision-making, however, seems limited or absent so far. Our study investigates this point by looking at factors that challenge and facilitate the integration of social science information into Great Lakes fishery management based on fishery managers' opinions.

2. Research question and methods

We conducted 39 face-to-face semi-structured interviews with fishery managers during the annual Great Lakes committee meetings (Table 1). The study was exploratory in nature and is not necessarily representative of all fishery managers in the basin. We interviewed fishery managers from federal, state, provincial and tribal jurisdictions in all seven US states and Ontario. As our study covers the Great Lakes fishery across the whole basin, the majority of our interviewees were involved in the management of the recreational fishery in the seven US states.

A semi-structured interview guide was used to ensure that all participants answered the same set of questions. Interviews lasted
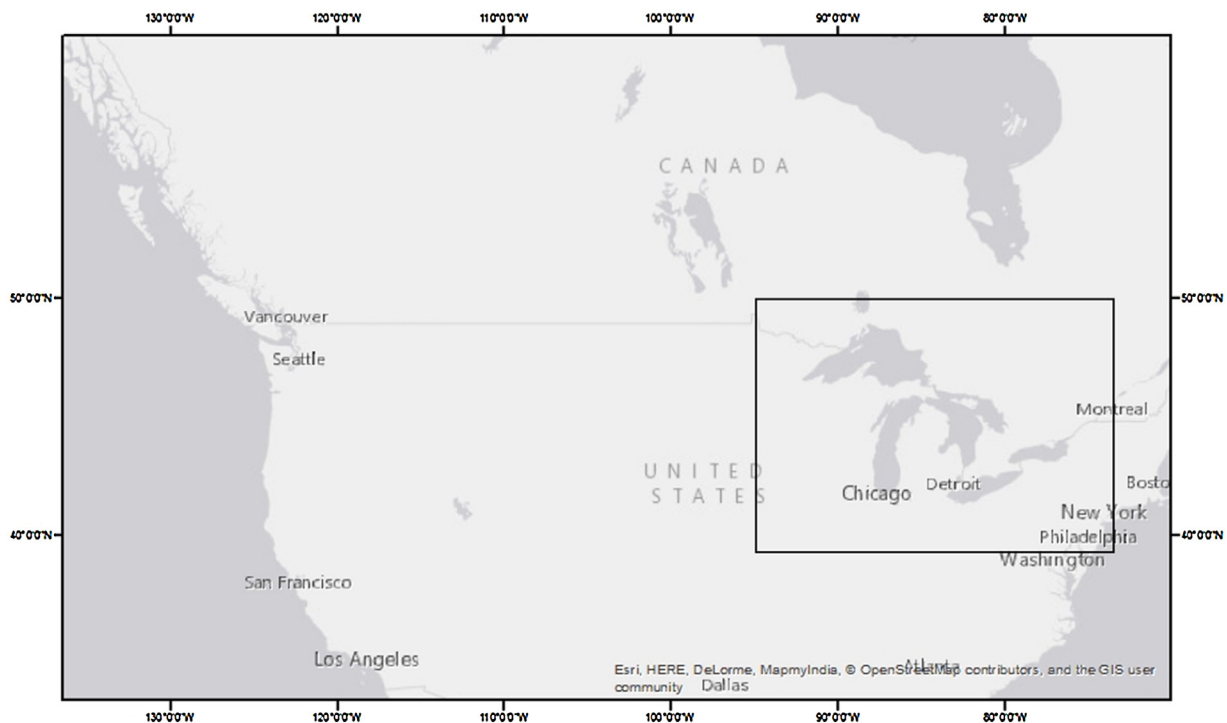

Fig. 1. Location of the Great Lakes in North America.