



Social networks and transitions to co-management in Jamaican marine reserves and small-scale fisheries



Steven M. Alexander^{a,b,*}, Derek Armitage^{a,b}, Anthony Charles^c

^a Department of Environment and Resource Studies, University of Waterloo, 200 University Avenue West, Waterloo, ON N2L 3G1, Canada

^b Environmental Change and Governance Group, University of Waterloo, 200 University Avenue West, Waterloo, ON N2L 3G1, Canada

^c School of Business and School of the Environment, Saint Mary's University, Halifax, NS B3H 3C3, Canada

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ABSTRACT

How social networks support or constrain the transition to co-management of small-scale fisheries and marine reserves is poorly understood. In this paper, we undertake a comparative analysis of the social network structures associated with the transition to co-management in three Jamaican marine reserves. Data from quantitative social relational surveys ($n = 380$) are integrated with data from semi-structured interviews ($n = 63$) and focus groups ($n = 10$) to assess how patterns of relational ties and interactions between and among fishermen and other local level actors (e.g., managers, wardens, NGO staff) support and constrain the transition to co-management. Our research suggests that the transitions to co-management were supported by a combination of three network structure and relational attributes: (i) the presence and position of institutional entrepreneurs; (ii) a dense central core of network actors; and (iii) the prevalence of horizontal ties and vertical linkages held by the community-based organizations formally responsible for the management of the marine reserves. Our findings also show that overall low network cohesion in the three reserves and limited social influence among the wardens may be problematic for sustained collective action that extends beyond the core set of network actors. These findings suggest the importance of strategies to enhance collective action, specifically through attention to the attributes of the corresponding social networks, as a means to contribute to successful transitions to co-management of marine reserves and small-scale fisheries. Our results provide more precise guidance, through social network analysis, on where in the respective networks social capital and leadership may require support or enhancement, and thus on how to target interventions for greatest effect.

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1. Introduction

Co-management arrangements for the conservation of natural resources have been discussed for decades (e.g., Charles, 1988; Pinkerton, 1989) and are increasingly adopted in coastal-marine environments (Evans et al., 2011; Gutierrez et al., 2011). The establishment and adoption of co-management approaches for marine protected areas (MPAs) – including marine reserves – have followed a similar trend (Johannes, 2002; Alcala and Russ, 2006; Govan, 2009). These newly established co-management arrangements often involve the devolution of responsibilities associated with day-to-day management of natural resources, and in some

instances a transfer of power and authority from national government agencies to communities and sub-national governments (Pomeroy et al., 2004; Carlsson and Berkes, 2005). In addition, co-management can involve the participation of local community groups or resource users in decision-making, implementation, and enforcement (Jentoft et al., 1998; Berkes, 2010). When MPAs are contemplated for coastal areas, there are typically strong interactions with small-scale fisheries, which can create significant governance issues, in terms of interactions between resource users and conservationists (Garcia et al., 2014), and for governance of MPAs themselves (Jones, 2014).

In such cases, when MPAs and small-scale fisheries interact, it is crucial to consider the corresponding ‘human dimensions’ (e.g., social, cultural, economic, and political aspects) (Charles and Wilson, 2009). Considerable progress has been made in understanding how these human dimensions influence transitions to co-

* Corresponding author. Fax: +519 746 0292.

E-mail addresses: s22alexa@uwaterloo.ca (S.M. Alexander), derek.armitage@uwaterloo.ca (D. Armitage), tony.charles@smu.ca (A. Charles).

management of MPAs and small-scale fisheries (Chuenpagdee and Jentoft, 2007; Cinner et al., 2012; Ayers and Kittinger, 2014). A key ingredient is the existence of formal and informal social networks to enable effective multi-actor management and governance arrangements (e.g., co-managed MPAs) (Carlsson and Sandström, 2008; Bodin et al., 2011). Social networks – and associated aspects of leadership, social capital, and appropriate institutions – have been suggested to play a critical role in effective transitions to co-management of small-scale fisheries (Crona and Bodin, 2010; Cinner et al., 2012; Gutierrez et al., 2011; Pomeroy and Andrew, 2011). Social networks are considered to contribute to increased collaboration (Armitage et al., 2009; Berkes, 2009), collective action (Ostrom, 1990; Pretty, 2003), and the adoption of new norms (Friedkin, 1998; Frank, 2011; Nunan et al., 2015).

However, not all networks are structurally equal. Different patterns of social relations (i.e. network structures) contribute to different management and governance outcomes (Bodin and Crona, 2009; Bodin and Prell, 2011). Accordingly, two major questions arise. First, how do social networks support and inhibit the transition to co-management, particularly in the context of weak state support (e.g., financial, institutional)? And second, what characteristics of the networks play the most significant role in this regard? We address these questions in the context of marine reserves and small-scale fisheries in Jamaica. Specifically, a comparative analysis is provided of the social networks associated with three *Special Fishery Conservation Areas* (SFCAs)—i.e. marine no-take areas.

We use a social relational network perspective as a conceptual model and associated suite of analytical methods to frame our analysis (see Alexander and Armitage, 2015). A social relational network perspective is informed by relational sociology (e.g., Emirbayer, 1997; Mische, 2011) and social network analysis (e.g., Wasserman and Faust, 1994), and emphasizes: (i) relations among individuals rather than personal attributes; (ii) networks rather than groups; and (iii) specific relations or patterns of relations relative to their broader relational context (Marin and Wellman, 2011; Alexander and Armitage, 2015). Taken together, these three points provide the underpinnings of a network perspective to examine the social dimensions of MPAs.

Empirical work to date concerning the role of social networks for natural resource management has largely focused on single case studies (e.g., Crona and Bodin, 2010). This study contributes to the limited number of comparative case studies that empirically examine the social relational dimensions in a natural resource management setting (Sandström and Rova, 2010a, 2010b). As Sandström and Rova (2010b) posit, comparative case studies enable the testing of hypotheses relating to network structure and function, and in turn provide the potential for “inductively identifying the design principles of successful systems [(i.e. governance arrangements)]” (p. 546). The differing co-management arrangements and actors associated with the three selected *Special Fishery Conservation Areas* we examine here provide a unique comparative opportunity (see Section 3.1).

The paper is organized as follows. First, we outline the theoretical foundation of our approach. An overview of the case study context and background is then provided along with a detailed account of the research methods we use. Next, we analyze specific structural features and characteristics of the three social networks against those theorized to influence key social processes. We then discuss the potential of the social networks to support and inhibit transitions to co-management of small-scale fisheries and MPAs. Accordingly, this paper presents a formative analysis (i.e. focusing on process) rather than a summative analysis (outcome-based). Furthermore, we consider the extent to which particular structural features, network ties, and key actors help to explain

previous experiences, as well as their implications for future and sustained collective action.

2. Social networks and co-management of small-scale fisheries

Much has been written about the co-management of small-scale fisheries (Berkes et al., 2001; Pomeroy and Andrew, 2011) and participatory approaches in implementing MPAs (e.g., White et al., 2002; Pomeroy et al., 2007; Charles and Wilson, 2009). There has also been considerable study of the interactions between MPAs and fisheries in terms of both biological/ecological (Hilborn et al., 2004) and social, economic, and governance aspects (e.g., Christie and White, 2007; Charles, 2010; Jones, 2014). What is relatively new to small-scale fisheries and MPA analysis, however, is the social relational network perspective (e.g., Ramirez-Sanchez and Pinkerton, 2009; Crona and Bodin, 2010). Here we focus on applying that perspective to identify the factors influencing transitions to co-management of small-scale fisheries and MPAs from centralized government-based management.

An important starting point in this exploration is the recognition that there is no ideal network structure for the diverse social processes necessary in natural resource governance contexts (Newman and Dale, 2005; Bodin and Crona, 2009). For example, a tension exists in regards to the right combination of bonding ties (i.e. “strong” ties that result from a combination of frequency of interaction, reciprocity, and emotional investment) and bridging ties (i.e. ties that connect two networks or sub-groups that would not otherwise be connected). While bonding ties develop local level trust, they can also lead to increased homophily (i.e. the process by which a network becomes composed of actors more similar with regards to socio-demographic, intrapersonal, and behavioral characteristics and thus less diverse), which has been shown to discourage experimentation and lead to the imposition of strict social norms (Newman and Dale, 2005). Similarly, bridging ties serve to introduce new information, yet tacit knowledge of complex systems requires repeated interactions associated with bonding ties (Bodin and Crona, 2009).

Insights from social network analysis imply that there are inevitable tradeoffs associated with favoring particular network characteristics and governance processes (Bodin and Prell, 2011; Henry and Volla, 2014). There is, as a result, no ideal network structure. One network will not necessarily serve all requisite social processes equally well. Different ‘ideal’ network structures may exist for different purposes. A high probability of tradeoffs associated with differing network structures requires an examination of multiple features, attributes, and processes. We focus here on social influence, network cohesion, as well as horizontal ties and vertical (i.e. multi-level) linkages to examine the role of social networks in fostering transitions to co-management of small-scale fisheries and MPAs.

Social influence serves as an entry point to consider the potential to establish new norms within a community of resource users (e.g., fishermen), such as shifting from open access to the implementation of no-take MPAs within a broader fishing ground. As Marsden and Friedkin (1993) suggested, relational ties “provide a basis for the alternation of an attitude or behavior by one network actor in response to another” (p. 127). Frank (2011) has further suggested that to better understand the role of social networks with regards to sustainable behaviors and practices, or the establishment of new norms, it is useful to identify relational ties that represent the flow of influence among a community of resource users such as fishermen. Central to the examination of social influence is the identification and examination of key actors.

Certain actors embedded within social networks can play a critical role with regards to introducing new norms and behaviors (Crona and Bodin, 2010; Crona et al., 2011; Frank et al., 2011). Such

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