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The inner workings of collaboration in marine ecosystem-based management: A social network analysis approach

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ABSTRACT

Collaboration across sectors and disciplines is widely identified as essential for the implementation of ecosystem-based management (EBM) in both marine and terrestrial settings. However, relatively little research has examined the inner workings of collaborative marine EBM processes. Social network analysis (SNA) is a suite of methods for systematically analyzing and mapping relations between individuals or organizations, and can be used as a means of understanding the inner workings of collaboration. The authors applied SNA methods to cases of collaborative marine EBM planning in Rhode Island and New York, U.S.A., focusing on network structure and the role and influence of individual actors within their respective planning networks. Results highlighted the importance of diverse, decentralized networks of moderate density as well as the influence that bridging ties, or "brokers," can wield in such processes. Research also found that non-governmental actors, such as university outreach specialists and scientists affiliated with environmental organizations, can be especially influential in collaborative marine EBM planning. This paper presents the results of this analysis, discusses the utility of this method for the analysis of collaborative marine EBM planning, and offers recommendations for future research and practice.

1. Introduction

The practice of ecosystem-based management (EBM), widely considered foundational to the comprehensive management of coastal and marine ecosystems [1], requires collaboration across jurisdictions, sectors, and disciplines [2,3]. However, the presence and effectiveness of such collaboration, within the context of the fragmented nature of coastal governance [4], requires further examination. While researchers have examined the implementation of EBM in general [5,6], and plan quality in particular [7], little work has analyzed the inner workings of collaborative marine EBM processes and the role and influence of individual actors within EBM planning networks.

Social network analysis (SNA) is a suite of methods for systematically analyzing and mapping relations between individuals or organizations [8] and can be used as a means of understanding the inner workings of collaborative processes [9]. This study applied SNA methods to cases of marine EBM planning in Rhode Island and New York, U.S.A., focusing on practitioners themselves and their individual and collective roles within their respective planning networks.[1] SNA was used to investigate one research question: What was the extent and nature of collaboration in the marine EBM planning process? This paper presents this study's SNA methods and results, discusses the utility of this method for the analysis of collaborative marine EBM planning, and offers recommendations for future research and practice.

2. Collaboration and marine ecosystem-based management

EBM generally refers to a comprehensive, integrated environmental management strategy that addresses the interactions between ecological processes and socioeconomic factors [1,12]. This approach represents a departure from sector- or activity-based management, and considers interactions between resources, activities, and sectors. EBM requires a diversity of perspectives and the incorporation of both ecological and social considerations, thus employing a systems perspective that embraces the complexity of human and natural systems [5]. By definition, EBM requires

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[1] This analysis was one part of a larger, mixed-methods study; see [10,11].

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extensive collaboration across jurisdictions, as ecosystems typically span political boundaries [2,3]. Additionally, collaboration must occur across disciplines and professions, so that practitioners have access to the right information and understand the full range of environmental, social, and economic interactions characterizing an ecosystem [7,13]. Yaffee and co-authors [6] describe collaboration as the single most important element of EBM because of the inherently transboundary nature of ecosystems. While collaboration is important for EBM in both marine and terrestrial settings, it is arguably of special importance in coastal and marine environments, which span the land-water interface and the myriad agencies, organizations, resources and uses which occupy or have an interest in these complex areas [4].

There is a broad literature on collaboration [14] and the application of this approach within the context of public management [15]. Within this literature, collaboration is typically defined to include a range of joint activities and partnerships which are voluntary efforts to solve problems which cannot be solved independently. Additionally, collaboration requires working in multi-organizational arrangements and building multi-sector relationships across boundaries to achieve common goals [16]. Because collaboration is inherently voluntary and trans-boundary, there are many barriers to collaboration, including the lack of opportunities and incentives; conflicting goals and missions; inflexible policies and procedures; and constrained resources [3].

Successful collaboration relies on action at both the individual and organizational levels. Wondolleck and Yaffee [3] call attention to the role of individuals in facilitating collaborative EBM processes, noting that mistrust, group attitudes, conflicting organizational cultures, and a general lack of support for collaboration can impede such processes. Brody [7] emphasized the importance of local land-use decision-makers in implementing EBM, and Burby and May [17] found that local decision-makers may have limited commitment to state environmental management goals, thereby inhibiting broader efforts to achieve environmental objectives. This draws attention to the importance of coastal management practitioners themselves in collaborative EBM.

3. Social networks and collaborative EBM

Networks provide insight into collaboration by allowing for analysis of the "internal deliberations" of collaborative processes [9]. Ties between actors in a network provide insight into communication and exchange of resources [8]. Exchange of information, ideas and resources toward solving a common problem is one fundamental attribute of collaboration, and networks are effective means through which these can be exchanged [18,19]. Networks have been identified as a means of promoting collaboration despite the fragmentation of authority among government agencies [20,21]. Researchers have also used social network concepts and analytical methods to investigate natural resource governance problems and processes [18,19,22] and the application of an ecosystem approach [21,23].

Social networks are valuable because they can enable the mobilization of diverse resources, thus facilitating collaborative responses to complex problems [18,24]. They can also facilitate the development of new and the exchange of existing knowledge, which is essential for managing complex systems like ecosystems [19,25]. Networks vary widely in structure and not all networks are well-suited to effective collaboration [24,26]. Attributes which may influence the effectiveness of collaboration include network structure and the position of individual actors within the network. Network density – the number of actors in a network, and the number of ties between them – is important for collaboration because it increases opportunities for communication, trust, and collective action [18]. However, the utility of density diminishes at high values because it leads to homogeneity of information and ideas [18,27].

Bodin and Crona [18] also describe key attributes of individual actors within the network, and note that "bridging ties" – actors who connect diverse subgroups – are important to the collaborative management of complex, boundary-spanning systems like ecosystems because they facilitate the exchange of information and knowledge, and can help develop trust and collective action [26,27], bringing together actors, resources, and opportunities who are not otherwise connected [28]. Such individuals are a source of social capital because they create diversity within a network, critical for developing collaborative solutions to complex environmental problems [24].

4. Case studies and methods

This study applied SNA to two cases of collaborative marine EBM planning: the Greenwich Bay Special Area Management Plan in Rhode Island (hereafter "RI") and the Great South Bay Ecosystem-Based Management Plan in New York (2007–2012) (hereafter "NY"). These cases were selected because they were self-described collaborative EBM planning efforts which took place around the same time in comparable areas within the northeastern U.S. Greenwich Bay is a 5-square-mile estuary off Narragansett Bay, RI, surrounded primarily by medium-density residential development. This planning process was led by RI's coastal management program, in coordination with a University of Rhode Island marine outreach office, from 2002 to 2005 and resulted in a document that was adopted into state law [29]. The Great South Bay is a 151-square-mile coastal lagoon on the south shore of Long Island, NY, also surrounded by medium-density development. This planning process was initiated by NY's coastal management program and led by an environmental organization in 2007–2008, and resulted in a plan released in 2012 [30]. The research presented here focused on coastal management practitioners who had been actively engaged in each of these processes. "Practitioners" was defined broadly to include coastal managers, policymakers, scientists, advocates, citizens, or others who were identified through a snowball sampling strategy described below.

SNA allows for the analysis and mapping of relationships between individuals or organizations, focusing on relations, or ties, between individual actors, and the overall network structure [8]. Data for this study were collected through a 15-min, web-based survey. Respondents were asked to share information about their affiliation, expertise, and involvement in developing the EBM plan. The survey then asked them to list the names, affiliations, and areas of expertise of "key people" they had worked with during plan development.[2]

This survey was administered to two samples of practitioners identified through a snowball sampling approach [31] modified for use in this network analysis as follows. For each case, initial participant lists were developed with input from key informants who had led the respective planning processes, and surveys were first administered to these participants. Responses to the above-mentioned "key people" question were then used to select a second round of participants, limited to those who had been

[2] The survey was adopted for use in each case with details of each planning effort. Instructions specified that "key people" could include "coastal managers, policymakers, planners, scientists, environmental advocates, citizens, or other key individuals." It included spaces for up to 15 names, though some respondents used the survey's comment box to include additional names. Follow-up or clarifying questions were asked as needed during interviews conducted for a second part of this study; see [11].