

Exploring the Role of Different Actors in Caribbean Coral Reef Governance Through Multi-level Social Networks

Explorando el Papel de los Diferentes Actores de la Gobernanza los Arrecifes de Coral del Caribe a través de Multi-nivel de las Redes Sociales

Explorer le Rôle des Différents Acteurs dans la Gouvernance des Récifs Coralliens des Caraïbes Grâce aux Réseaux Sociaux à Plusieurs Niveaux

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EXTENDED ABSTRACT

Governance of natural resources is often defined with terms such as *social coordination, interactions, and relationships* (Suárez de Vivero et al. 2008, Koimann et al. 2005, Hanna 1999) between *social agents of all types, the whole of public and private, or organizations and individuals* (Suárez de Vivero et al. 2008, Koimann et al. 2005, Lockwood et al. 2010). In natural resources, including Caribbean coral reefs, there has been a conceptual shift from natural resource management to governance; with this shift there is increasing importance on the inclusion of multiple actors, both private and public (Stoker 1998, Chakalall et al. 1998). Many benefits have been seen in the incorporation of greater public engagement and participation, such as increased cooperation, increased perceptions of fairness of decision-making, increased compliance, and reduced costs of management (Schneider et al. 2003). The benefits of participation of a wider range of stakeholders, combined with the increased number of actors have begun to encourage devolution and decentralization of resource governance (Suárez de Vivero et al. 2008).

Current research trends emphasize understanding and addressing underlying social and economic drivers, recognition of uncertainties, integration of multiple sectors and scales, and inclusion and participation of stakeholders (Burke et al. 2011, Cash et al. 2006, Mahon et al. 2008, Reed 2008). Stakeholder participation, and the underlying communication that is necessary for participation, is critical in many current approaches to marine management, such as co-management (including adaptive co-management) and ecosystem based management (Pomeroy and Berkes 1997, Carlson and Berkes 2005, Berkes 2008, Gelcich et al. 2007, Gelcich et al. 2010). Social networks, the structure of actors and the relationships between them, are gaining attention in discussions of adaptive natural resource management based on different forms of participation and co-management (Anderes et al. 2007, Olsson et al. 2004). A number of authors have explicitly promoted the use of network thinking and social network analysis (SNA) to look at fisheries governance interactions, especially in consideration of the transition from hierarchical management towards governance structures with an inclusion of a greater number of actors (Sandström and Rova 2010, Hartley 2010, Gibbs 2008, Bodin and Crona 2009, Marin and Berkes 2010). SNA can be used as a tool to quantify the relationships and interactions between actors and understand the roles of these actors within a network. With an increased focus on inclusion of actors from multiple levels and sectors, it is important to be able to examine the linkages between these in order to better inform and influence governance. This study aims to investigate the relationships between actor groups involved in the governance of coral reefs by focusing on communication and information sharing between the actors that are either governing, being governed, or providing information and advice, with respect to coral reef management.

This research is being conducted as part of the Future of Reefs in a Changing Environment (FORCE) Project, which investigates ecosystem health, livelihoods of reef-dependent communities, governance structures, and their relationship to the successful management of Caribbean reefs. Within this larger project, the goals of the network research are to:

- i) Map relationships between actors, both local and national level, involved in the use and governance of coral reefs in 12 communities across four Caribbean countries;
- ii) Compare the structural properties of these networks; and
- iii) Provide recommendations for improvements to coral reef governance networks. As part of the FORCE social science research, this study is being conducted in four Caribbean countries that exhibit a range of socioeconomic, geographic and biophysical characteristics. In each of these four countries, three contrasting communities are visited, chosen to reflect a gradient of reef-related tourism and reef fishing dependency. Preliminary results for one study site, the community of West End in the Bay Islands of Honduras, are presented here.

Initial scoping was conducted to compile a list of actor groups (groups involved in governing, those being governed, or providing information and advice, with respect to coral reef management) in West End, which was then confirmed with local key informants. Interviews were conducted with representatives from each of the identified actor groups using a ‘roster’ method (showing a pre-made list of actor groups to the interviewee) to collect information about relationships between the interviewee’s organisation or group and other listed actor groups. The semi-structured interviews included questions to elicit both quantitative and qualitative information on a number of relationships, such as: communication, information sharing, shared views, cooperation, trust, conflicts, and changes in these relationships over time. Interviews were conducted in both English and Spanish between July and August 2011. Interviews were digitally recorded and transcribed from English or translated and transcribed from Spanish.

The reef governance network identified for West End included a number of different actors. The Bay Islands are in a ‘Zone of Special Protection’ as declared by the Honduran government. On the island of Roatan, the West End/Sandy Bay Marine Reserve is a protected area that is co-managed by two non-governmental organisations (NGOs), the Bay Islands Conservation Association (BICA) and Roatan Marine Park, as well as the governmental department ICF (Instituto de Conservación Forestal, Institute of Forestry Conservation). The community of West End is popular for dive tourism, with approximately 14 dive shops currently in the community. Additional marine based tourism includes fishing and snorkel tours and water taxis that transport tourists to nearby beaches with additional water sports. Reef fishing in the West End/Sandy Bay Marine Reserve is limited to line fishing. West End has several local organisations unrelated to reef use (two water boards which deal with fresh water resources, and a *patronato* or community council), a Water Taxi Association, and the island of Roatan has a fisher’s association. There are several NGOs (local, regional, and international) that are either located in West End or that have representatives that live in West End. The island of Roatan has municipal government offices and is the home to a number of regional offices for national government departments, such as DIGEPESCA (Department of Fisheries). There are several national government departments that are associated with coral reef use and reef management; all are located on the mainland, in the capital city of Tegucigalpa.

The preliminary analysis of the communication network found that local level resource users hold very few to no links to any level of government (municipal or national) (Figure 1). Roatan Marine Park (part of ‘locally based NGOs’ shown in Figure 1) is very well connected, both to local resource users, government departments, and other NGOs. There are very few links from BICA to the

resource users, despite their role in co-managing the local marine reserve. There is also a highly connected network between the NGOs located both in West End and the mainland of Honduras, suggesting that these NGOs maintain good links to other levels of the network.

In addition to holding a central role in this network, Roatan Marine Park is also perceived to have an important role in this network. Interviewees at all levels were asked the question “*Who has influence over decisions about marine resources and their use?*” Respondents gave between one and three responses and Roatan Marine Park mentioned by over 50% of the individuals interviewed at both the national and local levels. Resource users, local government offices, and members of national government departments all saw Roatan Marine Park as having influence over decisions about marine resources. Not only did actors from multiple levels in the network see Roatan Marine Park as having influence over decisions about marine resources, but they also trusted the organisation and valued the roles of NGOs in the network. A member of ICF stated “we do have a relationship with [the municipal government offices], but with the many limitations that we have, we rely a lot on the NGOs. We trust the NGOs a lot.”

NGOs can hold an important role in bridging actor groups at different levels in coral reef governance. In the case of West End, Roatan Marine Park has a very important bridging role between resource users, other NGOs, and government departments, and it has worked to maintain these connections. Further analysis and research will allow comparisons with this site and the other two study sites in Honduras, as well as further comparisons with study sites in an additional three countries. Through

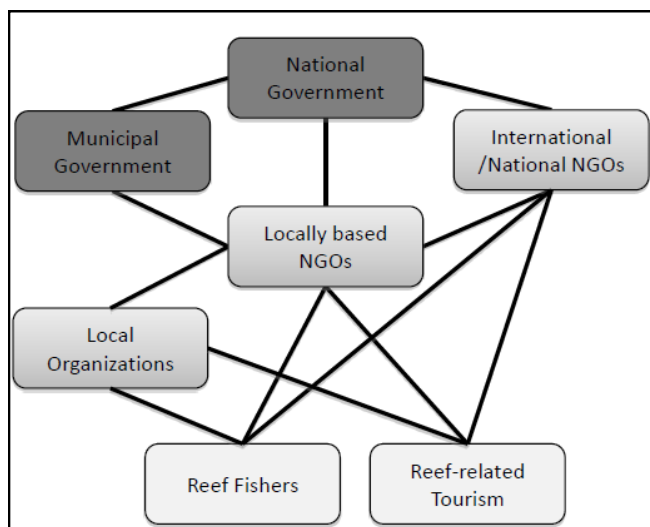


Figure 1. Simple model of communication taking place between resource users and organisations in West End, the municipal government on the island of Roatan, national government departments, and national and international NGOs based in Honduras. Model based on reciprocal communication relationship data between individual actor groups or organisations within each node.

research in 12 sites across four countries, the roles of NGOs, government, local organizations, and resource users in coral reef governance networks will be more fully investigated. Results will be used to explore the use of SNA as a tool for understanding governance and management of Caribbean coral reefs and to provide recommendations to improve coral reef governance through the better understanding of these networks.

Schneider, M., J. Scholz, M. Lubell, D. Mindruta, and M. Edwardsen. 2003. Building Consensual Institutions: Networks and the National Estuary Program. *American Journal of Political Science* 47:143–158.

Stoker, G. 1998. Governance as Theory: Five Propositions. UNESCO/Blackwell Publishers, Oxford, United Kingdom.

Suárez de Vivero, J., J. Rodríguez Mateos, and D. Florido del Corral. 2008. The paradox of public participation in fisheries governance. The rising number of actors and the devolution process. *Marine Policy* 32:319–325.

LITERATURE CITED

- Anderies, J.M., A.A. Rodriguez, M.A. Janssen, and O. Cifdaloz. 2007. Panaceas, uncertainty, and the robust control framework in sustainability science. *Proceedings of the National Academy of Sciences of the United States of America* 104:15194–15199.
- Berkes, F. 2008. Evolution of co-management: Role of knowledge generation, bridging organizations and social learning. *Journal of Environmental Management* 90:1692–1702.
- Bodin, O. and B.I. Crona. 2009. The role of social networks in natural resource governance: What relational patterns make a difference? *Global Environmental Change-Human and Policy Dimensions* 19:366–374.
- Burke, L., K. Reytar, M. Spaulding, and A. Perry. 2011. *Reefs at Risk Revisited*. World Resources Institute, Washington, D.C. USA.
- Carlsson, L. and F. Berkes. 2005. Co-management: concepts and methodological implications. *Journal of Environmental Management* 75:65–76.
- Cash, D.W., W.N. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, et al. 2006. Scale and cross-scale dynamics: Governance and information in a multilevel world. *Ecology and Society* 11:8.
- Chakalall, B., R. Mahon, and P. McConney. 1998. Current issues in fisheries governance in the Caribbean Community (CARICOM). *Marine Policy* 22:29–44.
- Gelcich, S., G. Edwards-Jones, and M.J. Kaiser. 2007. Heterogeneity in fishers' harvesting decisions under a marine territorial user rights policy. *Ecological Economics* 61:246–254.
- Gelcich, S. T.P. Hughes, P. Olsson, C. Folke, O. Defeo, M. Fernandez, et al. 2010. Navigating transformations in governance of Chilean marine coastal resources. *Proceedings of the National Academy of Sciences of the United States of America* 107:16794–16799.
- Gibbs, M. 2008. Network governance in fisheries. *Marine Policy* 32:113–119.
- Hanna, S.S. 1999. Strengthening governance of ocean fishery resources. *Ecological Economics* 31:275–286.
- Hartley, T.W. 2010. Fishery management as a governance network Examples from the Gulf of Maine and the potential for communication network analysis research in fisheries. *Marine Policy* 34(5):1060–1067.
- Kooiman, J., M. Bavinck, S. Jentoft, and R. Pullin (eds.). 2005. *Fish for Life: Interactive Governance for Fisheries*. University of Amsterdam Press, Amsterdam, The Netherlands.
- Lockwood, M., J. Davidson, A. Curtis, E. Stratford, and R. Griffith. 2010. Governance principles for natural resource management. *Society and Natural Resources* 23:986–1001.
- Mahon, R., P. McConney, and R. Roy. 2008. Governing fisheries as complex adaptive systems. *Marine Policy* 32:104–112.
- Marin, A. and F. Berkes. 2010. Network approach for understanding small-scale fisheries governance The case of the Chilean coastal co-management system. *Marine Policy* 34(5):851–858.
- Olsson, P., C. Folke, and F. Berkes. 2004. Adaptive co-management for building resilience in social-ecological systems. *Environmental Management* 34(1):75–90.
- Pomeroy, R. and F. Berkes. 1997. Two to tango: The role of government in fisheries co-management. *Marine Policy* 21: 465–480.
- Reed, M.S. 2008. Stakeholder participation for environmental management: A literature review. *Biological Conservation* 141:2417–2431.
- Sandström, A. and C. Rova. 2010. Adaptive Co-management Networks: a Comparative Analysis of Two Fishery Conservation Areas in Sweden. *Ecology and Society* 15:14.