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The Evolution of Polycentric Governance in the Galapagos Small-Scale Fishing Sector

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Abstract
Addressing the multiple anthropogenic and non-anthropogenic factors affecting small-scale fisheries requires collaboration from diverse regions, geographical scales, and administrative levels in order to prevent a potential misfit between governance systems and the socio-ecological problems they address. While connecting actors and stakeholders is challenging, as they often hold opposing perceptions and goals, unveiling the network configurations of governance systems remains one effective way to explore collaborative alliances in light of the diverse drivers of change present in small-scale fishery systems. This study employed descriptive statistics, exponential random graph models (ERGMs), and qualitative data analysis to explore preferential attachments of new nodes to well-positioned nodes within the Galapagos small-scale fishery governance system network and the propensity of cross-sectoral reciprocity and cross-sectoral open triads formation in the network. Our findings identified significant players and network configurations that might be essential in the collaboration diffusion and robustness of the Galapagos small-scale fishery sector governance system.

Keywords Collaboration · Social network analysis · Small-scale fisheries

Introduction

Today, small-scale fishing governance systems face different challenges in formulating strategies capable of addressing multiple problems. We live in an increasingly interconnected world, where problems in a social-ecological system originate in numerous and simultaneous interactions and exposures from local and global scales (Ostrom 2012; Barnes et al. 2017; Berkes 2017). The effects of global and local dynamics at present—characterized by high uncertainty, complexity and unexpected changes—make social-ecological transformations and uncertainty an inevitable occurrence in small-scale fisheries systems. Consequently, aligning small-scale fishery governance systems with the social-ecological dimensions they are meant to address also becomes challenging (Rijke et al. 2012; Lubell and Morrison 2021).

Small-scale fishery governance systems should consider spatial scale (i.e., capacity to match a social-ecological system's geographical extent), temporal scale (i.e., capacity to act on time), and functional scale (i.e., capacity to match a social-ecological system's functional dynamics and interactions); recognizing this is crucial when dealing with complex social-ecological systems (Young 2002; Cumming et al. 2006; Galaz et al. 2008; Wandel and Marchildon 2010; Bodin and Tengö 2012; Bodin et al. 2014; Epstein et al. 2015). However, it is necessary to recognize that the management scale of those governance systems encompasses multiple types of fit simultaneously to span a socio-ecological system's scope in the face of change (Pittman and Armitage 2017; Bergsten et al. 2019; Ishihara et al. 2021). Today, the management capacity of governance systems depends not only on its ability to fit with environmental and ecological concerns but also on its ability to fit with various societal problems and stakeholders' expectations (Acton et al. 2021; Ishihara et al. 2021). Global

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sustainability challenges (Lubell and Morrison 2021) pressure governance systems to align as much as possible with the spatial, temporal, and functional dimensions of the system (e.g., with the interactions between marine species and fishers' actions). Moreover, unexpected socio-economic and environmental changes and needs can emerge in socio-ecological systems (e.g., due to the adverse impacts of novel pandemics such as 2019 novel coronavirus or COVID-19, climate change, or unreported fishing); this has broadened the management scope of social-ecological governance systems and the need to address "the problem of fit" more closely (Galaz et al. 2008; Rijke et al. 2012; Fried et al. 2022).

How society responds to the evolving conditions through collaborative approaches is an essential component of addressing the problem of fit in small-scale fishery governance systems (Armitage and Plummer 2010; Alexander et al. 2017). By recognizing this, this paper aims to improve the Galapagos small-scale fishery collaboration network and the notion of governance fit within the Galapagos small-scale fishery sector by considering attributes stemming from institutional fit, adaptive co-management, polycentrism and subsidiarity (summarized in Fig. 1). Here, we offer a methodological approach that draws on social network analysis and qualitative data analysis. This novel research approach enables analysts to represent, capture and unveil relationships and interdependencies in social and ecological environments; we thus employ it to examine specific network patterns and configurations that may strengthen the collaborative links of Galapagos small-scale fishery governance system.

We explore in this study the preferential attachment of nodes (i.e., the likelihood of adding collaborative ties to well-positioned nodes) in the Galapagos small-scale fishery governance network. In doing so, we employ descriptive statistics (centrality measures), estimate the propensity toward reciprocity and open triad formation (as explained in Fig. 2) across sectors using exponential random graph models (ERGMs), and analyze interviews. Throughout the paper, we use nodes, referring to those organizations and agencies connected to the Galapagos' small-scale fishery governance network and those organizations that may be part of the collaborative network of Galapagos small-scale fishery governance in the future. At the same time, we refer to links/ties to the organizations' connectivity in terms of other organizations and agencies.

In this paper, we argue that institutions and agencies may be able to more wisely discern how to choose and create collaboration partners based on the nodes' positions, features and needs, rather than leaving it to chance or to policies and laws to define collaboration ties. This implies that organizational ties in a governance system network can become more dynamic, moving from delegated organizational links to organizational ties where actors can make choices regarding the partners with whom they collaborate. Our theoretical framework might guide practitioners as to the spread and allocation of elements needed in social-ecological governance systems networks, such as governmental and international support, including financial aid, economic incentives and subsidies, technology, data exchange, and co-production of knowledge, along with other determinants and instruments deemed significant in building robust collaborative networks.

The theoretical approach of this paper provides stakeholders with a broader image of where collaboration links might have a more extensive influence on collaboration diffusion in a network. It offers stakeholders a platform for evaluating whether collaboration alliances need to be created, enhanced or reformulated. Stakeholders may analyze whether or not it is necessary to create mutual links (A ↔ B) (Fig. 2a) or include a third collaboration party C into an existing A–B collaboration. If so, the inclusion of a new collaboration partner would lead to an open triadic (Fig. 2b) or a triadic closed organizational network configuration (Fig. 2c), where organizations involved can benefit and strengthen each other by sharing organizational goals and resources.

Figure 2a: if there are mutual interactions between organizations and agencies (A ↔ B) in a governance structure, such organizations and agencies are likely share efforts, such as financial resources, technicians, knowledge, and data. They also serve as baseline for the formation of open or closed triadic network configurations, implying further diffusion and propagation of collective efforts. This

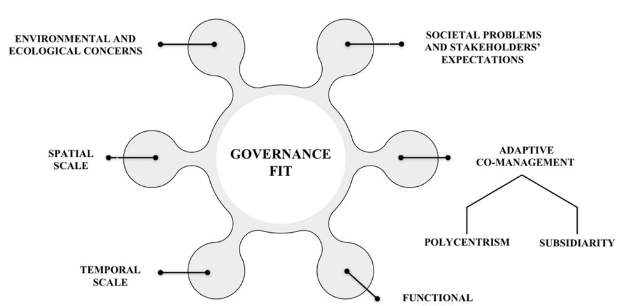


Fig. 1 Governance fit

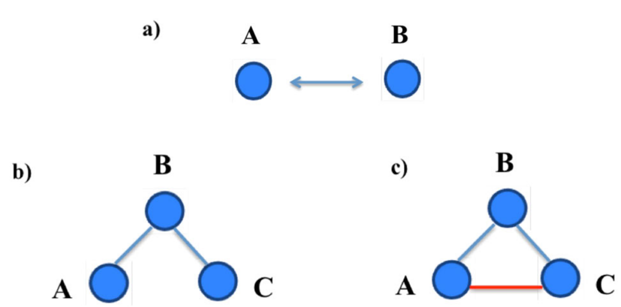


Fig. 2 **a** Reciprocity, **b** Open triads, **c** Closed triads

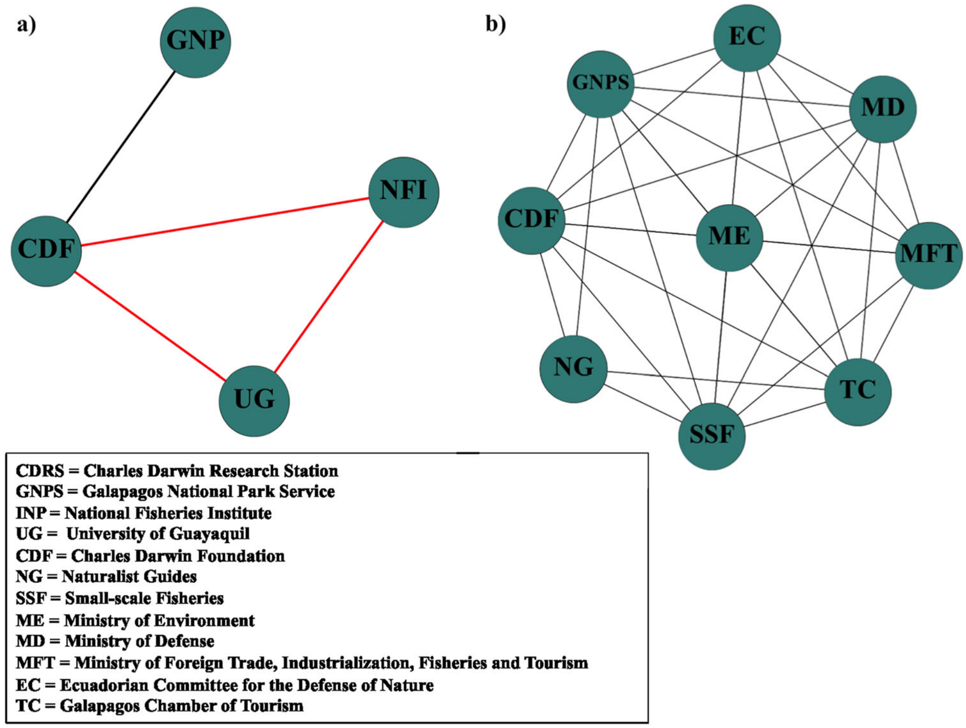


Fig. 3 **a** Polycentricity onset in the 1960s, **b** delegated polycentricity in the 1990s

often starts when organizations and agencies create an initial organizational link and reciprocate organizational ties (A ↔ B). Figure 2b: if collaboration connections A–B and B–C exist, it is likely that a new organizational link A–C would be formed (red line in Fig. 2c), giving rise to a triadic closure configuration. The analysis of open triads enables us to indicate the likelihood of partners of partners to become collaboration partners, which implies that the A–B and B–C collaboration ties might be transmitted to A–C in a governance system structure (Lomi and Pallotti 2012; Pittman and Armitage 2017).

Paths Toward Collaboration and Polycentric Links in Galapagos

Although the conservation of Galapagos marine resources was not a priority at the time, institutional ties to protect these resources date back to the 1960s, when the Charles Darwin Research Station (CDRS), the first international research organization in the Islands, and the Galapagos National Park (GNPS), the first governmental organization for conservation purposes in Galapagos, were created and signed the first collaboration agreement to foster research and conservation in the Galapagos (Castrejón et al. 2014). This agreement marked a turning point for the development of Galapagos fishery science by giving rise to a series of institutional links in the Galapagos, which were initiated when the GNPS and the CDRS requested that US Peace Corps volunteer Jerry Wellington explore coastal intertidal and subtidal ecosystems of Galapagos in the 1970s (Reck 2014). Wellington's outcomes highlighting the marine biodiversity and endemism of the Galapagos served to consolidate the first official inter-institutional cooperation agreement between the CDRS and the National Fisheries Institute (Spanish acronym: INP) in 1976, joined a year later by the University of Guayaquil, in order to explore the Galapagos fishery resources state in terms of abundance and distribution (Castrejón et al. 2014). This effort gave rise to the first triadic network configuration involving reciprocated ties in the Galapagos small-scale fishery sector network (A ↔ B; B ↔ C; C ↔ A), represented by the red links in Fig. 3a (i.e., network configurations that narrow and facilitate collaboration in networks).

Galapagos marine resources have been subjected to fishery exploitation since the late eighteenth century (Castrejón et al. 2014). British and North American whalers and sealers pioneered commercial exploitation in the archipelago. Sperm whales (*Physeter macrocephalus*), fur seals (*Arctocephalus galapagoensis*), and Galapagos sea lions (*Zalophus wollebaeki*) were the primary targets species (Castrejón et al. 2014). Notably, the demands of the Asian market for shark fins, together with the sea cucumber (*Isostichopus fuscus*) capture in the 1980s and later collapse in the 1990s in close collaboration between Asian intermediaries with Galapagos local fishers and fishers from coastal provinces of Ecuador; prompted great interest in the management, conservation and commercialization of marine resources in the Galapagos (Castrejón et al. 2014). As a result, between the 1980s and 1990s, the number of immigrants from Ecuador's mainland, small-scale fishing fleets, and tourists on the islands increased significantly, giving rise to the establishment and interests of diverse scientific institutions, governmental and non-governmental bodies, and various local fishing cooperatives (Castrejón et al. 2014), as well as diverse legal provisions, institutional arrangements and strategies, shaping changes from a top-down command control form of governance to one with more polycentric links in the Galapagos.

The completion of the management plan of the Galapagos Marine Reserve (Spanish acronym: PMRMG) by the so-called Grupo Nucleo in 1994, the preparation process and later adoption of the so-called Galapagos Special Law (GSL) in 1998, that led to the Marine Reserve (GMR) establishment and the Galapagos co-management system (GCM) implementation (Castrejón et al. 2014), as well as the 2007 inclusion of the Galapagos Islands into the list of endangered World Heritage Sites by UNESCO (Morrison et al. 2020b), marked significant milestones in constructing governance environments with more polycentric links by prompting diverse ties between national public and private international and local organizations and agencies.

Significantly, the GCM, administered mainly from the governmental side, gave rise to delegated institutional ties (Fig. 3b) under two management bodies: the so-called Participative Management Board (PMB), formed by representatives from the GNPS, the small-scale fishery (elected among the Galapagos Fishing Cooperatives), the Galapagos Chamber of Tourism, the CDRS and naturalist guides to represent the local level; and the so-called Inter-institutional Management Authority (IMA), formed by representatives from three ministries based on Ecuador's mainland (Ministry of Environment, Ministry of Defense and Ministry of Foreign Trade, Industrialization, Fisheries and Tourism), representatives of local sectors (the small-scale fishery sector and the Galapagos Chamber of Tourism) and the Ecuadorian Committee for the Defense of Nature and the Environment (Spanish acronym: CEDENMA) to represent a higher level of the decision-making process and decide if there was no consensus among the representatives of the PMB at the local level. Under the IMA structure, CDRS acted as a technical advisor and the GNPS as a technical secretariat for the Ministry of Environment (Denkinger et al. 2014; Barragán 2015).

Since the reform of the GSL in 2015, the Galapagos co-governance has been changing its original governance structure. With GSL reforms, the PMB and the IMA were repealed, giving rise to new delegated organizational links —formed by, and run primarily from, the governmental side —to lead decision-making processes. Today, the GSL is being amended, giving rise to discussions to consolidate a new consultative governance scheme, whose operational legal framework remains unclear and inactive. Therefore, collaboration and organizational ties in the Galapagos small-scale fishery sector, involving actors from diverse administrative levels and scales, continue to change due to changes on the governance structure and the creation of new management tools, including the management plans of the Galapagos National Park Directorate (Spanish acronym: DPNG) and the Galapagos Special Regime Governing Council (Spanish acronym: CGREG).

Nodes indicate organizations and agencies. Ties represent the organizational connections between organizations and agencies. The red ties of Fig. 3a show the first triadic network configuration involving reciprocated ties in the Galapagos small-scale fishery network, as described above. Note: Despite the vital role that Asian intermediaries played in the development of the Galapagos sea cucumber fishery, they were not recognized as a sector or actor in the Galápagos fishery system; therefore, they were not members of the PMB. This gave rise to two parallel management systems: the GCM, and the system formed by Asian intermediaries who, in partnership with local fishers, set up clandestine camps to catch and process sea cucumbers. See also the discussions regarding evolving polycentric governance of the Great Barrier Reef in Morrison (2017) who initially coined the term delegated polycentricity, and the role of Asian intermediaries in the exploitation of Galapagos sea cucumbers in Castrejón and Defeo (2015).

Moving Beyond Co-Management

Although co-management has undoubtedly been a significant approach in response to the limitations of centralized, top-down governance, as well as the increasing demands of natural resource users and local communities to be part of the decision-making processes that affect their livelihoods, it is essential to note that the social-ecological interactions that span the small-scale fisheries systems are more complex and dynamic than the way that co-management literature initially considered them. The human and ecological environments of small-scale fisheries change day to day; this is due to significant problems that create multiple socio-ecological interactions beyond the co-management scope as a category of institutional arrangements to share power and responsibility between the government and local resource users (Berkes et al. 2003; Armitage et al. 2007). Today, we have witnessed closely that we live in a new era of the Anthropocene (Hughes et al. 2017; Morrison et al. 2020a; Lubell and Morrison 2021). The uncertain behavior of complex social-ecological interactions has broadened the small-scale fisheries governance scale. The incomplete transition toward the new Galapagos governance system established by the new GSL, in combination with the adverse impacts of the COVID-19, climate change and illegal, undeclared and unregulated fishing by national and international fleets, makes evident the need to explore other governance forms and further organizational links at diverse geographical and administrative levels, from local to international beyond the Galapagos Marine Reserve protected area and the DPNG jurisdiction that enable to align the Galapagos small-scale fishery governance system as much as possible with the extent, timing and functional diversity of social-ecological systems interactions and prevent a misfit.

Achieving an approximation to such socio-ecological fit requires strategic approaches that support the cooperation and interaction of diverse public and private actors from various jurisdictional levels and geographical scales in order to ensure more sustainable outcomes (Folke et al. 2002; Olsson et al. 2007; Clark and Clarke 2011). Adaptive co-management (AC) is an emerging approach for common-pool resources management that enables the delivery of responses to social-ecological changes operating on multiple scales and levels, guided by subsidiarity principles and polycentricism (Folke et al. 2005; Ostrom 2010; Plummer et al. 2017; Carlisle and Gruby 2019). The subsidiarity principle implies that actions should be taken at the lowest practical level of governance, which in complex social-ecological systems ensures that decisions are made as near as possible to those whose livelihoods might be affected by decision-making structures (Marshall 2008). Significantly, the subsidiarity principle—sometimes referred to as "good governance"—provides an important platform for taking into account the proper stakeholders and local priorities; disregarding these considerations could reinforce the current status quo, which often reflects political economic inequalities and vested interests (Armitage et al. 2007, 2012). Different from monocentric forms of governance characterized by hierarchical governance structures (e.g., driven by a governmental authority or private monopoly) (Mitchell 2019; Morrison et al. 2019) (Fig. 4a), polycentric systems of governance imply the presence of multiple semi-autonomous nodes in decision-making processes (Stephan et al. 2019; Carlisle and Gruby 2019; Mudliar and O'Brien 2021), a central feature in complex social-ecological systems for facilitating linkages (i.e., partnerships; Fig. 4b) that span broad geographical scales and administrative levels in order to act as close as possible to social-ecological interactions and the underlying causes of vulnerability (Folke et al. 2005; Ostrom 2010; Plummer et al. 2017).

Nodes indicate organizations and agencies in a governance structure. Ties indicate the organizational links between organizations and agencies. The gray nodes in 4a represent either governmental organizations (e.g., in a common-pool resource governance system with a strong presence of the government over decisions) or private organizations (e.g., in a monopoly). Node color in 4b indicates the economic sector (blue nodes = private sector organizations and agencies; gray nodes = public sector organizations and agencies). This implies cross-sectoral interaction between different organizations regardless of their economic sector and administrative level. Furthermore, it is important to point out that while the existence of multiple semi-autonomous decision centers might be enough to deem a governance arrangement as polycentric, it does not mean that there will be enough coordination among such centers to ensure that a system acts as a polycentric governance system, see discussion in Carlisle and Gruby (2019) and Mudaliar (2020). The latter consideration is particularly important in terms of the influence of power in the management of common-pool resources. Power dynamics are pivotal to defining polycentric systems and coordination among decision-making centers (Mudaliar 2020). Without the actual intention to share power, cross-sectoral and cross-level interactions are challenging to achieve, keeping a system from functioning as one polycentric governance system (Morrison et al. 2019; Mudaliar 2020). At the same time, it is essential to bear in mind that an unclear distribution of responsibilities among decision-making centers in polycentric systems may give rise to confusion and functional and geographical overlaps between higher and lower administrative levels, also hindering the polycentric governance system (Wyborn 2014; Mudliar and O'Brien 2021).

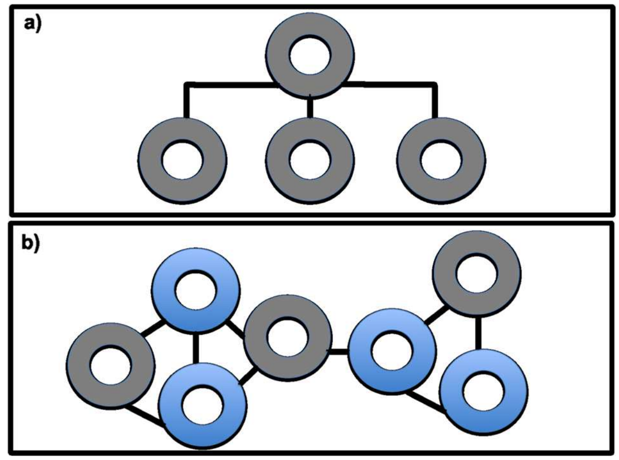


Fig. 4 **a** Monocentric forms of governance, **b** polycentric forms of governance

Much of the criticism placed on common-pool resources governance systems has emerged because, among some reasons and deficiencies, they tend to suggest panacea/blueprint solutions for all types of problems (i.e., fixed standard universal solutions for various issues, see discussion in Ostrom (2007) and Ostrom and Cox (2010). The complexity that embraces small-scale fishery social-ecological systems' interactions demands management strategies and policies should be viewed as place-specific experiments that can be revised, adapted and changed as different social-ecological circumstances demand (Folke et al. 2002, 2005; Armitage et al. 2008). AC is an evolving framework that provides elements to be learned via experimentation and learning from joint actions on broad geographical scales and administrative levels (i.e., learn by doing) (Armitage et al. 2007, 2009; Ostrom 2010). AC provides platforms that allow the participation of various stakeholders from local to broader non-local organizations and actors—possessing different sorts of resources such as social memory, financial resources, knowledge and data, among other adaptive capacity determinants, which can be activated when needed to navigate the dynamic nature (non-linear relationship) of interconnected socio-ecological dimensions (complex systems thinking) to deal more appropriately with uncertainty and rapid changes of small-scale fishery social-ecological systems (Armitage et al. 2007; Plummer and Armitage 2010; Rijke et al. 2012; Mitchell 2002).

Case Study

Our case study focuses on the Galapagos small-scale fishery sector, a crucial socio-economic sector in the biodiversity hotspot that inspired Darwin's theory of evolution, located 1200 km off the Ecuadorian coastline (Fig. 5). We focus our study on this sector considering that it plays a significant role in providing seafood to ~30,000 residents and 271,000 tourists who arrive annually in the Galapagos (in pre-COVID-19 conditions), making it a crucial sector for the food security of the archipelago. The case study of the Galapagos small-scale fishery sector serves to highlights today's need for governance systems to deal with the unforeseen trans-boundary social-ecological interactions (e.g., due to the effects of COVID-19) present in complex socio-ecological systems. These have affected diverse fishing communities in the islands due to the linkage of the fishery sector with the tourism sector. Fishing communities are seafood suppliers assisting the development of tourism, the main livelihood and source of income in the Galapagos. In this context, an approximate reduction of 73% in visitors to the Galapagos as a result of measures designed to reduce the spread of the COVID-19 virus and the number of people infected directly affected the socio-economic situation of the Galapagos small-scale fishing sector. The measures, which included the prohibition of all national and international tourist arrivals in the archipelago during the early months of the pandemic, and a subsequent mandatory negative polymerase chain reaction test for entry into Ecuador and the Galapagos, led to the number of visitors to the Galapagos dropping from 271,238 visitors in 2019 to 72,519 in 2020 (DPNG 2021).

Methods

Data Collection

The study used various methods to collect data, since data collection coincided with the COVID-19 pandemic, which limited human contact. We explored the history and institutional interactions in the Galapagos through a review of previous studies on marine and conservation science development in the Galapagos ($n = 41$), including peer-reviewed journal articles, policy documents, organizational records and institutional publications from the government and the private sector. To this end, we used Google and Google Scholar to search the following keywords: Galapagos governance, Galapagos small-scale fishery, Galapagos collaborative arrangements and governance, and GCM. We also used the reference list of relevant peer-reviewed papers about the development of marine and conservation science in the Galapagos as a guide to decide which articles to read. The review enabled us to examine organizations from different geographical scales and administrative levels and create a list of nodes that traditionally do not possess significant links within the Galapagos small-scale fishery governance system network ($n = 28$). However, they operate directly and indirectly in the Galapagos conservation and marine development areas (in normal conditions—pre-COVID-19). We used this list and the Galapagos small-scale fishery collaboration network of the work by Caceres et al. (Unpublished results)—a network comprised of 43 organizations and agencies connected through 257 organizational links—to (a) suggest a preferential attachment of nodes from our list into the Galapagos small-scale fishery sector collaboration network presented by Caceres et al. (Unpublished results), (b) explore cross-sectoral reciprocity configurations and cross-sectoral, open triad configurations in the Galapagos small-scale fishery sector collaboration network presented by Caceres et al. (Unpublished results) and (c) interview representatives and officials ($n = 12$) of diverse local and international public and private institutions and agencies that do not have significant ties to the Galapagos small-scale fishery sector network presented by Caceres et al. (Unpublished results).

Representatives and officials noted in (c) were presented with a series of open and closed questions. They were asked (1) how the respondent's organization might collaborate in the Galapagos small-scale sector if there were institutional arrangements in place (e.g., financial resources, technical and scientific knowledge, local knowledge acquired over time, data and information, equipment and technology, infrastructure, or monitoring of illegal fishing or research projects), and (2) about the administrative level (local, national or international) and economic sector (public or private) of their organizations. A Qualtrics software,

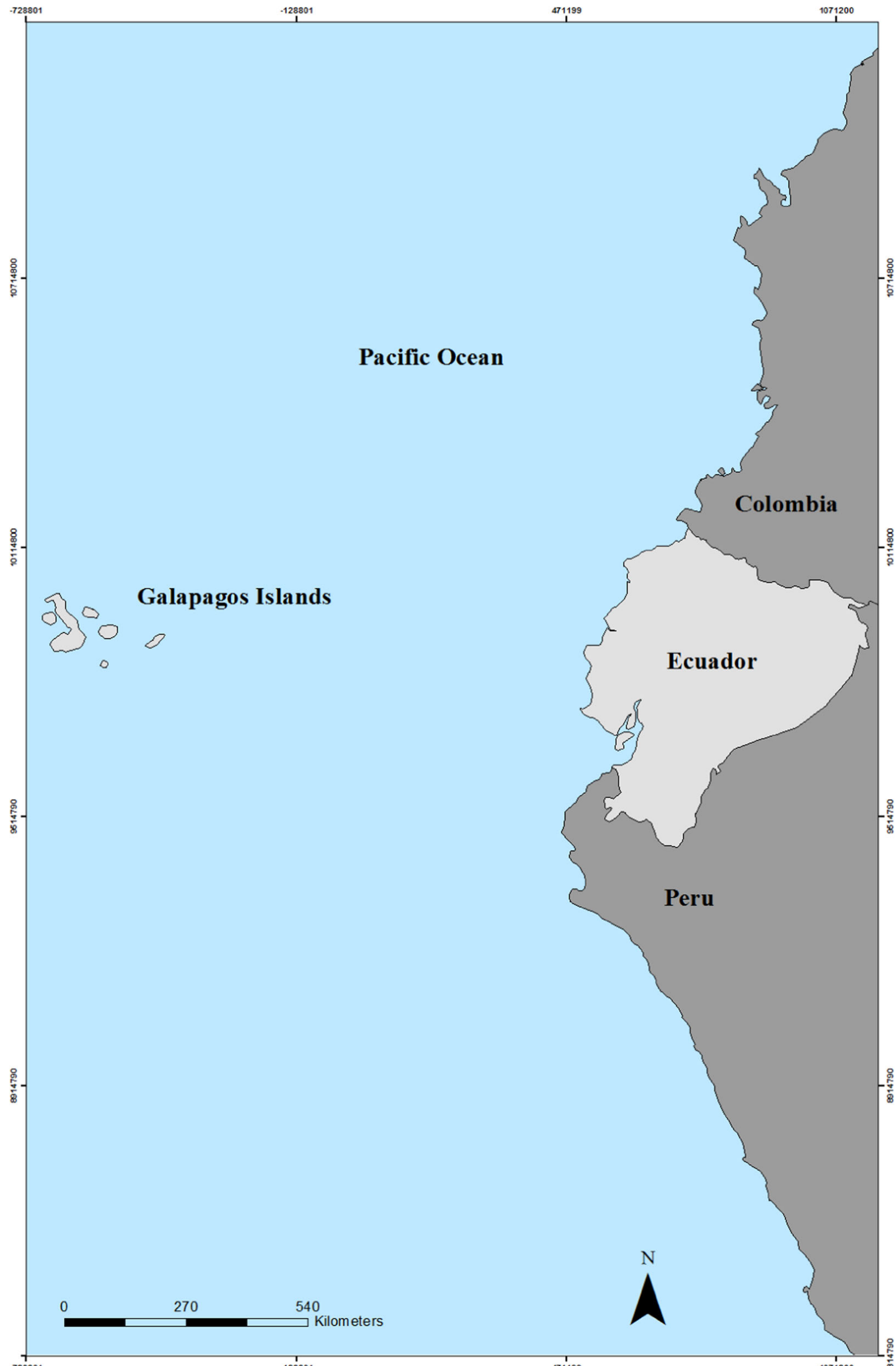


Fig. 5 Location map

Version 6.2020 of Qualtrics (Copyright © [2020] Qualtrics) was used to create our study questions (in Spanish), send personalized links to the individuals' institutional email address and store respondent's answers. Informed consent was obtained via an initial question in the Qualtrics survey. We collected the data of the study between June 2020 and December 2020. We kept the survey open from September 10 to December 18, 2020. This study received ethics clearance (ORE #41927) from our university's research ethics system.

Data Analysis

Representatives' and officials' answers [noted in (1) in the data collection section] were translated from Spanish to English, and transcribed and coded using the qualitative data analysis software NVivo (released March 2020) (QSR International Pty Ltd. 2020). The coding procedure, undertaken by the study's corresponding author, was both deductive and inductive. The codes were developed using categories from the question [noted in (1) in the data collection section]. We used Gephi network visualization 0.9.2 software (Bastian et al. 2009) to suggest the preferential attachment of nodes [indicated in a) in the data collection section] using centrality measures, degree centrality, eigenvector centrality, and closeness centrality. We used PNet software (Wang et al. 2009) to examine the propensity of reciprocity cross-sectoral formation and cross-sectoral open triads formation in the network [indicated in b) in the data collection section]. For this purpose, we developed a series of hypotheses using a building blocks (motifs) approach (i.e., network configurations representing specific network patterns in an observed network), representing basic network configurations we deem significant preconditions to facilitate network collaboration within governance systems (Fig. 6) (see more regarding "building blocks," in Milo et al. (2002) and their application in various studies in Berardo and Scholz (2010), Chadès et al. (2011), Matti and Sandström (2011), Bodin and Nohrstedt (2016), Dee et al. (2017), Mcallister et al. (2017), Levy and Lubell (2018) and Matous and Wang (2019).

To capture the propensity toward the network configurations/building blocks shown in Fig. 6, we used one asymmetric adjacency matrix (i.e., a value assignation of zeros and ones according to the presence or not of ties between nodes in the network) and two attribute matrices (i.e., a value assignation of zeros and ones according to the presence or not of nodes' attributes). In the adjacency matrix, organizational links in the Galapagos small-scale governance system network were set as 1, and the absence of the organizational relations was set as 0. In the first attribute matrix, public sector nodes were assigned as 1, and private sector nodes were assigned as 0. In the second attribute matrix, private sector nodes were established as 1, and public sector nodes were established as 0. We used these matrices and the parameters presented in Fig. 6 to run two models on PNet software (see also Table 2). We tested whether the parameters converged at *t*-statistic <0.1 and had a good fit at goodness-of-fit < 0.1 (Robins and Lusher 2012).

Results

Descriptive Statistics Results

Our descriptive statistical analysis identified actors whose position and centrality values within the network can contribute to and influence collaboration diffusion in the Galapagos small-scale fishery sector (e.g., CGREG, DPNG, fishing cooperatives, Charles Darwin Foundation (CDF). Our centrality analysis indicated that various actors with high centrality (i.e., nodes' that sent and received more collaboration ties compared to others in the network) were present in the network (Fig. 7 and Table 1). Specifically, these were: the governmental organizations GO01 and GO02, the fishing cooperative FC02, the governmental organization GO05, the fishing cooperative FC01, the international non-governmental organization NGO01, the governmental organization GO04, the municipal government MG01, the governmental organizations GO03 and GO06 and the international non-governmental organization NGO05, respectively (see Fig. 7 and Table 1).

Our analysis showed various actors with higher eigenvector centrality values compared to others in the network (i.e., nodes' importance based on their connections to influential nodes in the Galapagos small-scale fishery governance system, in other words the value of well-connected friends) (Fig. 8 and Table 1). Specifically, these were: the governmental organizations GO01 and GO02, the fishing cooperatives FC04, FC03, FC01 and FC02, the governmental organizations GO03, GO05, GO06, GO08, GO09 and GO07, respectively (see Fig. 8 and Table 1).

Our closeness centrality analysis indicated various actors with higher closeness centrality values than other organizations and agencies in the Galapagos small-scale fishing governance system network (i.e., nodes' importance based on their closeness to all nodes in the network) (Fig. 9 and Table 1). Specifically, these were: the governmental organizations GO01 and GO05, the international non-governmental organizations NGO01 and NGO05, the governmental organization GO04, the fishing cooperative FC02, the municipal government MG01, the fishing cooperative FC01, the governmental organization GO06 and the international non-governmental organization NGO02, respectively (see Fig. 9 and Table 1).

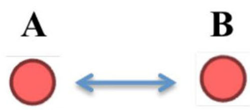
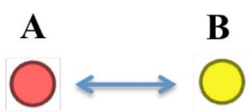
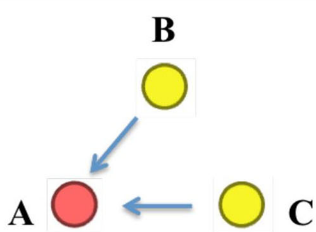
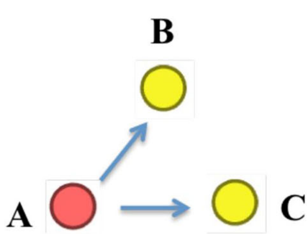
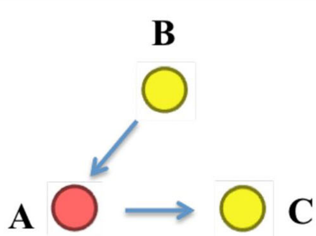
Parameters with Binary Attributes	Hypotheses
	Hypothesis 1: Mutual ties between nodes from the public sector - [Attr]-Interaction- reciprocity parameter.
	Hypothesis 2: Mutual ties between nodes from the private sector - [Attr]-Interaction- reciprocity parameter.
	Hypothesis 3: Mutual ties between nodes from the private and public sector- [Attr]-Activity- reciprocity parameter.
	Hypothesis 4: Open triad formation involving nodes from the public and private sector - [Attr]-in-2-star parameter.
	Hypothesis 5: Open triad formation involving nodes from the public and private sector - [Attr]-out-2-star parameter.
	Hypothesis 6: Open triad formation involving nodes from the public and private sector - [Attr]-2-path parameter.

Fig. 6 Building blocks/hypotheses used when estimating cross-sectoral reciprocity and open triad network configurations of the Galapagos small-scale fishing governance system. ERGMs are a class of statistical models that enable capturing the presence or absence of specific network configurations in a social network. ERGMs provide a platform to statistically examine the propensity of building blocks in a more extensive network (Bodin and Tengö 2012). Pink nodes represent organizations and agencies from the private sector, and yellow nodes represent organizations and agencies from the public sector in the network

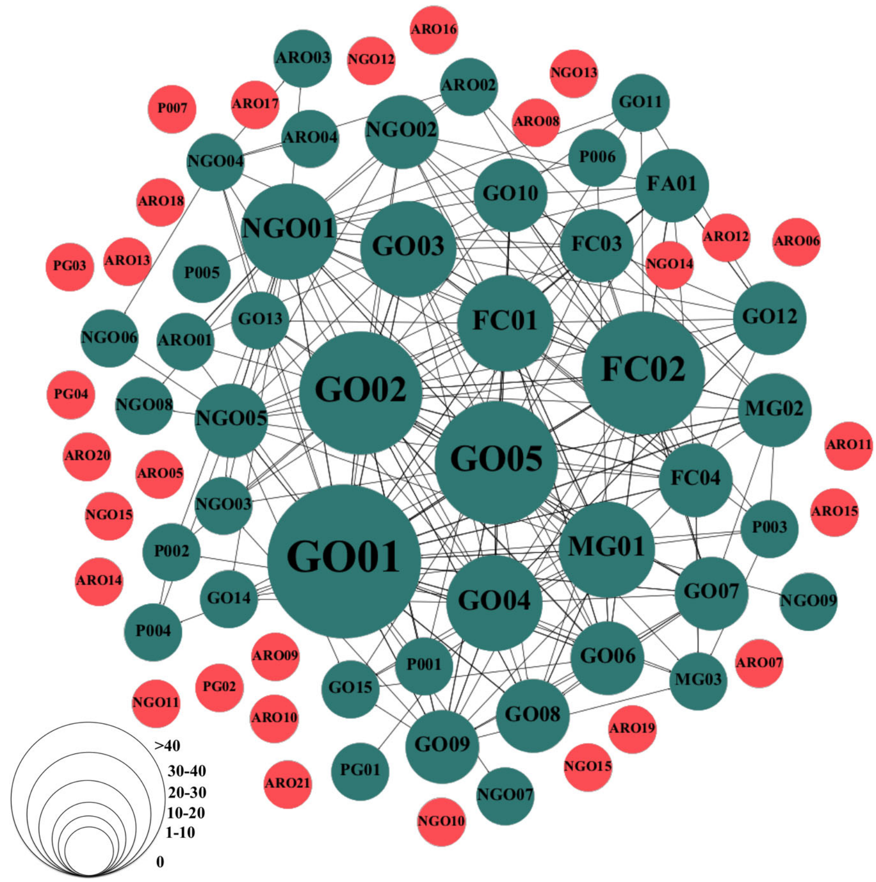


Fig. 7 Degree centrality of the Galapagos small-scale fishery governance network. Nodes indicate the organizations and agencies (GO governmental organization, PO private organization, FA fishery association, NGO non-governmental organization, MG municipal government, PG parish government, ARO academic and research organization). Ties indicate the organizational links between organizations and agencies. Green nodes indicate nodes connected to the Galapagos small-scale fishery network. Pink nodes indicate organizations and agencies that traditionally do not have significant organizational links with the Galapagos small-scale fishery governance system network. Node size indicates degree centrality, meaning that as the size increases, they send and receive more organizational links than others in the network, making them important players in this fishery governance network, as most of the links pass through them

ERGMs Results

In terms of cross-sectoral reciprocity configuration formations, we found no strong evidence that nodes from the private sector tended to reciprocate organizational links between them (Hypothesis 2, Table 2). However, we found a positive and significant propensity of nodes from the public sector to reciprocate organizational links between them (Hypothesis 1, Table 2). Significantly, we found a positive and significant propensity of nodes from the private sector and the public to return ties (Hypothesis 3, Table 2); this was notable considering the value of multi-sectoral links in decision-making structures of common-pool resource governance systems. Estimates on cross-sectoral open triad formation were positive and significant (Table 2). Our results showed a positive and significant effect based on [Attr]-in-2-star (Hypothesis 4, Table 2), [Attr]-out-2-star (Hypothesis 5), and [Attr]-2-path (Hypothesis 6, Table 2) parameters. We believe this signified cross-sectoral collaboration diffusion and likely diffusion of diverse determinants of adaptive capacity in the network (such as knowledge, technology, data, and expertise) needed to address diverse multidimensional internal and external factors of change that might affect the present and future stability of the sector.

Qualitative Data Analysis

Effective collaborative responses to diverse simultaneous drivers of change necessitate embracing a social-ecological perspective that involves different sorts of information, skills, and stakeholders at different geographical scales and administrative levels. Recognizing this is significant if we aim to improve the governance capacity to anticipate and adjust to simultaneous drivers of change, particularly in this era of constant change and evolution (Smit and Pilifosova 2003; Smit and Wandel 2006; Armitage et al. 2017). Our results show that diverse organizations and agencies from various geographical and administrative levels, with no significant collaboration ties within the Galapagos small-scale fishery governance system, might collaborate with the Galapagos small-scale fishery system through diverse forms:

> Our collaboration in the management of the artisanal fishing sector could be carried out through technical support and donation of equipment to strengthen the infrastructure they have and improve marketing strategies for their products. PG02 node of Figs. 7–9, Level: Local, Sector: Public.

Table 1 Descriptive statistics of the Galapagos small-scale fishery sector

Actor	Level	Sector	Degree centrality	Eigenvector centrality	Closeness centrality
GO01	Local	Public	**41**	**0.946958**	**0.677966**
GO02	Local	Public	**34**	**1**	**0.5**
GO03	National	Public	**21**	**0.688491**	**0.5**
GO04	National	Public	**25**	0.393516	**0.588235**
GO05	National	Public	**31**	**0.593424**	**0.677966**
GO06	Local	Public	**18**	**0.58451**	**0.519481**
GO07	Local	Public	14	**0.499183**	0.47619
GO08	Local	Public	11	**0.568119**	0.43956
GO09	Local	Public	15	**0.519037**	0.47619
GO10	National	Public	14	0.30492	0.470588
GO11	National	Public	5	0.248856	0
GO12	National	Public	12	0.155603	0.470588
GO13	National	Public	6	0.341234	0
GO14	Local	Public	5	0.298025	0
GO15	National	Public	6	0.292194	0
P001	Local	Private	4	0.049082	0.43956
P002	Local	Private	4	0.043318	0.430108
P003	Local	Private	6	0.159707	0.454545
P004	Local	Private	3	0.125825	0
P005	Local	Private	1	0.037381	0
P006	Local	Private	2	0.086462	0
FC01	Local	Private	**29**	**0.719052**	**0.547945**
FC02	Local	Private	**33**	**0.731034**	**0.571429**
FC03	Local	Private	14	**0.748158**	0
FC04	Local	Private	**17**	**0.756154**	0.416667
FA01	National	Private	12	0.284361	0.434783
NGO01	International	Private	**28**	0.329197	**0.645161**
NGO02	International	Private	11	0.065363	**0.519481**
NGO03	International	Private	6	0.174079	0.373832
NGO04	International	Private	8	0	0.456522
NGO05	International	Private	**17**	0.14111	**0.597015**
NGO06	International	Private	2	0.017383	0
NGO07	International	Private	1	0.10373	0
NGO08	International	Private	2	0.053662	0
NGO09	International	Private	1	0.049082	0
MG01	Local	Public	**22**	0.449672	**0.571429**
MG02	Local	Public	12	0.309859	0.47619
MG03	Local	Public	7	0.368432	0.296296
PG01	Local	Public	1	0.043318	0
ARO01	National	Public	5	0.037381	0.465116
ARO02	National	Private	5	0.161212	0
ARO03	National	Public	2	0.038482	0
ARO04	International	Private	1	0.001102	0

Numbers in bold indicate higher centrality values

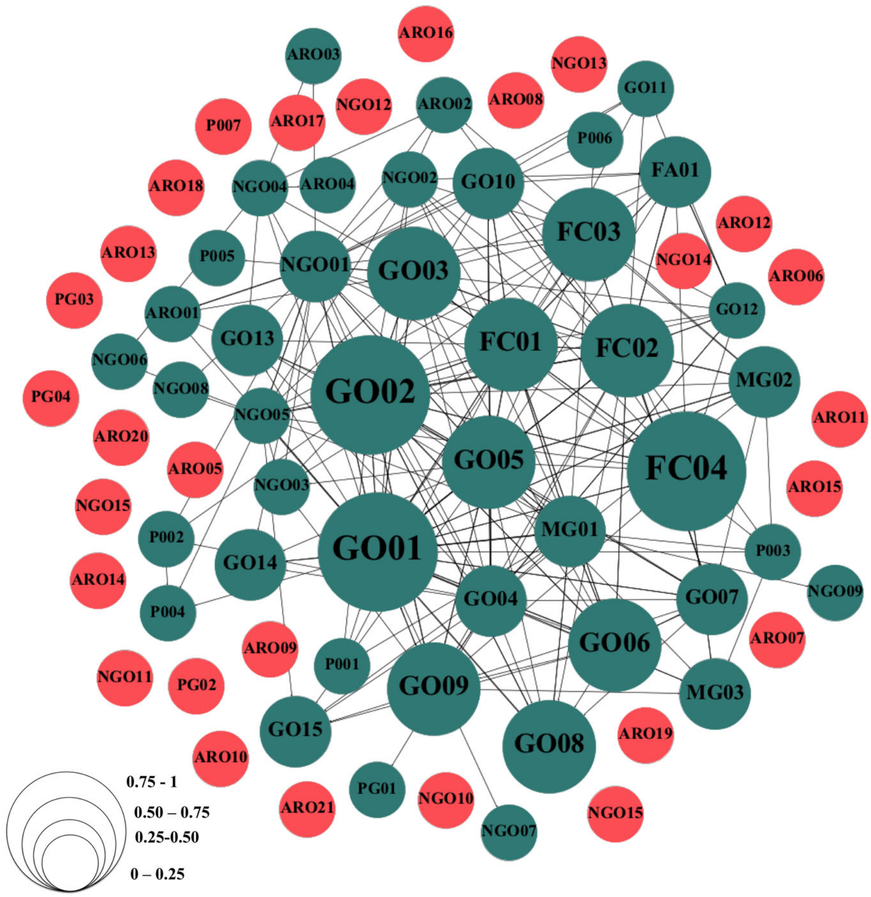


Fig. 8 Eigenvector centrality of the Galapagos small-scale fishery governance network. Nodes indicate the organizations and agencies (GO governmental organization, PO private organization, FA fishery association, NGO non-governmental organization, MG municipal government, PG parish government, ARO academic and research organization). Ties indicate the organizational links between organizations and agencies. Green nodes indicate those nodes connected to the Galapagos small-scale fishery network. Pink nodes indicate nodes that traditionally do not possess significant organizational links in the Galapagos small-scale fishery governance system network. Node size indicates eigenvector centrality, which signifies that, as a node's size increases, it is deemed more important in the network based on its connections to important players in the fishery governance system. Larger nodes are thus influential players in the network, able to reach important organizations and agencies and diffuse critical information and knowledge in the Galapagos small-scale fishery network

> We might stimulate the consumption of local fishery products in the tourism sector and to report incidents or non-regulated vessels within the Galapagos Marine Reserve. GO15 node of Figs. 7–9, Level: National, Sector: Public.

> We can deliver specific projects that can provide information for decision-making. NGO15 node of Figs. 7–9, Level: International, Sector: Private.

> We constantly make reports of the guided visits, and we can provide information about the management of the fishing sector in the places of visit. P005 node of Figs. 7–9, Level: Local, Sector: Private.

Using the language employed by Dietz et al. (2003), it is important to note that governance systems should be viewed as a co-evolutionary race. While the existing Galapagos small-scale fishery sector collaborative network provides a significant umbrella to deal with multiple drivers of change, incorporating new actors at different geographical scales and administrative levels into the current Galapagos small-scale fishery collaborative network might lead to exploring further external cooperation links. The following quotes from interviewees are significant in that regard:

> We have projects related to fisheries in other parts of the world whose experience and information could be made available to local actors. NGO07 node of Figs. 7–9, Level: International, Sector: Private.

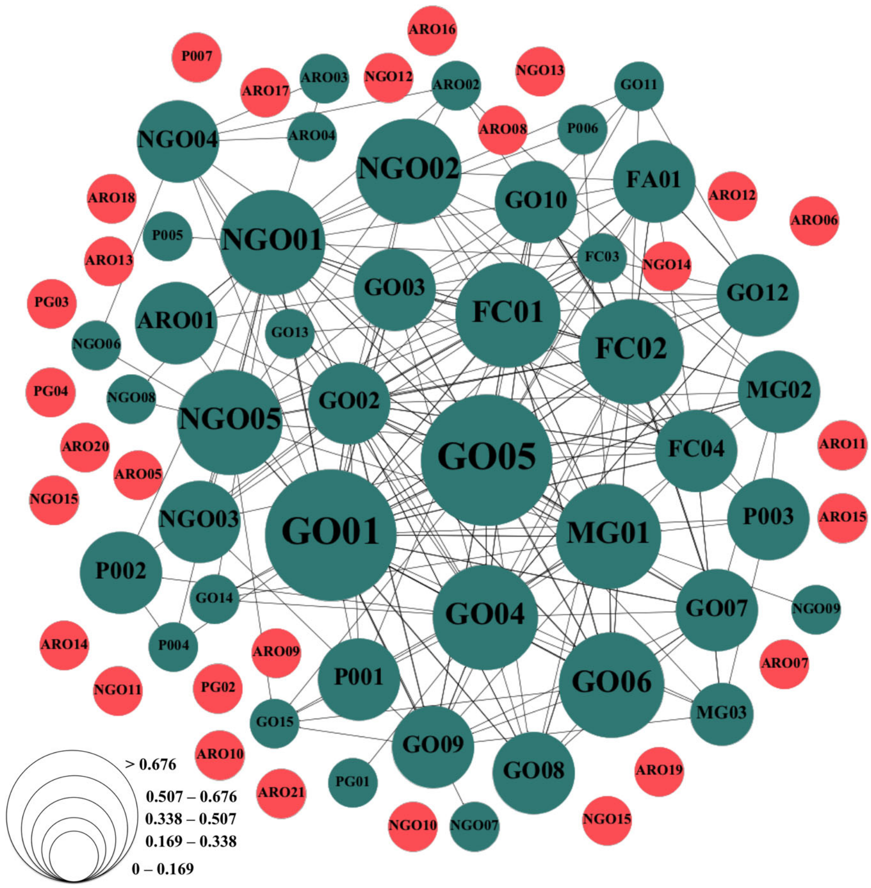


Fig. 9 Closeness centrality of the Galapagos small-scale fishery governance network. Nodes indicate the organizations and agencies (GO governmental organization, PO private organization, FA fishery association, NGO non-governmental organization, MG municipal government, PG parish government, ARO academic and research organization). Ties indicate the organizational links between organizations and agencies. Green nodes indicate those nodes connected to the Galapagos small-scale fishery network. Pink nodes indicate nodes that traditionally do not possess significant organizational links in the Galapagos small-scale fishery governance system network. Node size indicates closeness centrality, which signifies that as a node's size increases, it is deemed important based on its closeness to all nodes in the network. This makes more central nodes significant players in the network for dispersing knowledge or information faster than others, due to their closeness to all nodes in the Galapagos small-scale fishery governance system network

> We have research groups at both the University of Malaga and the Spanish Institute of Oceanography based in Fuengirola (Malaga) with experience in fisheries. ARO10 node of Figs. 7–9, Level: International, Sector: Private.

> We are a multidisciplinary research center that brings together researchers from different universities in Ecuador and the world. Our alliances with academia are very important in developing knowledge, information gathering, and training that contribute to sustainability. ARO04 node of Figs. 7–9, Level: International, Sector: Private.

> We could sign an Inter-institutional Cooperation Agreement with the fishing sector to finance projects of interest. PG01 node of Figs. 7–9, Level: Local, Sector: Public.

In adaptive co-management, continuous learning is crucial in approximating a governance system as close as possible to one desired functional state. From a governance perspective, learning refers to the process of detecting and correcting errors to achieve better outcomes over time (Mitchell 2019). In this context, the literature of social-ecological systems often differentiates between different types of learning include single-loop learning (i.e., correcting mistakes by adjusting resource management strategies and actions), double-loop learning (i.e., correcting errors by adjusting behaviors and attitudes) and triple-loop learning (i.e., addressing conflicts by designing or revising governance norms and protocols to produce significant changes in governance) (Armitage et al. 2008). Managing complex social-ecological systems largely depends on

Table 2 ERGM results

Hypothesis	Parameter (Pnet names)	Estimate	Standard error (ER)	*t*-statistics	Goodness-of-fit (GOF)
Model 1					
–	Arc	−1.35	0.22	−0.03[a]	−0.09
–	A2P-T	−0.07	0.03	−0.07[a]	−0.12
Hypothesis 1	[Attr]-Interaction- reciprocity (Public sector)	1.01	0.15	0.06[a]	−0.01
Model 2					
–	Arc	−1.90	0.13	−0.05[a]	−0.17
Hypothesis 2	[Attr]-Interaction- reciprocity (Private sector)	−0.66	0.52	0.005	−0.07
Hypothesis 3	[Attr]-Activity- reciprocity (Private ↔ Public sector)	1.43	0.27	0.06[a]	−0.05
Hypothesis 4	[Attr]-in-2-star	0.08	0.01	0.08[a]	−0.08
Hypothesis 5	[Attr]-out-2-star	0.06	0.02	−0.01[a]	−0.05
Hypothesis 6	[Attr]-2-path	−0.07	0.02	0.003[a]	−0.12

A *t*-statistic <0.1 indicates a converged hypothesis. GOF < 0.1 indicates a good fit

[a]Indicates a significant parameter

moving from scattered and individual learning processes to collective learning, transitioning from single-loop learning to double-loop and triple-loop learning. The following quotes from interviewees are significant in that regard:

> We are an educational entity; our collaboration would be clearly linked to education. We have previously linked the children of fishers in educational programs such as the Sea Turtle Monitoring Program. NGO08 node of Figs. 7–9, Level: International, Sector: Private.

> As has been done in previous years, our collaboration would be oriented to training and workshops for the socio-organizational consolidation of the fishing cooperatives and the organization and strengthening their legal scope. NGO15 node of Figs. 7–9, Level: International, Sector: Private.

With the above in mind, a crucial development in social-ecological systems lies in the question of who is learning and from whom (Armitage et al. 2008). It is important to recognize that the scientific community and rigid governance structures have often viewed scientific production as the only way of solving problems. However, learning at the local scale is crucial to addressing uncertainty and the changing local conditions that generate vulnerability. Local actors possess particular knowledge and experience acquired over the years, which if it is aligned to the right actors, might potentially strengthen the Galapagos small-scale fishery collaborative network. The following quotes from interviewees are significant in that regard:

> Marketing in conjunction with the fishing sector as part of a macro project to collect food products that involve the rural sector. We could contribute with local knowledge acquired overtime to motivate youth to get involved in the fishing sector. PG04 node of Figs. 7–9, Level: Local, Sector: Public.

> They could count on our group of local volunteers to be part of the participatory processes. P006 node of Figs. 7–9, Level: Local, Sector: Private.

Discussion

Our research suggests that understanding the structures of governance systems is a significant contributor to creating synergies among stakeholders to achieve collective outcomes that lead to more robust social-ecological systems in light of multiple adverse drivers of change. Governance systems often represent the different structures by which societies shape collective actions (Tortajada 2010; Lockwood et al. 2010). Bearing this in mind, our research indicates that addressing the extent of the effects of unprecedented and simultaneous drivers of change (such as climate change, novel pandemics, illegal marine fishing, invasive species, among other wicked problems) demands a deeper understanding by those involved in governance systems (Morrison et al. 2020a; Lubell and Morrison 2021). These must have a clear grasp of the governance actors, with their interactions and network configurations between different sectors, geographical scales and administrative levels (Baird et al. 2016; Kanwar et al. 2016; Bergsten et al. 2019). In this context, we argue that actors within the Galapagos small-scale fishing governance system network may create strategic alliances to deal with external and internal drivers of change and enhance the governance system fit. This will be possible if they explore further organizational ties and network configurations across sectors and geographical scales, and keep track of the organizations' positions and features in the existing small-scale fishing governance network. Approximating as closely as possible the governance scale of the Galapagos small-scale fishing sector with the extension of the multiple social-ecological interactions in the Galapagos (fit) by including a few delegated organizations and organizational links designated by law is challenging, if not impossible to achieve (Bodin 2017; Fried et al. 2022). Managing and controlling wicked problems spanning the Galapagos small-scale sector, such as climate change or the introduction of rapid mitigation measures to address novel pandemics, requires the collective effort of diverse organizations and agencies beyond state and national boundaries.

Our results show that understanding certain degrees of network distribution can provide valuable information for strengthening the Galapagos small-scale fishery collaborative network. It could provide additional pathways for the diffusion of determinants of adaptive capacity, along with better coordination and collaboration among actors within the fishing governance network. Our descriptive statistics suggest that various organizations and agencies occupy important positions within this network. Our centrality analysis indicates that certain organizations and agencies send and receive more organizational links than others in the network (Fig. 7 and Table 1). We deem it important to unveil these nodes in the governance network considering that these organizations and agencies probably control decisions in this network. Therefore, if we aim to incorporate new collaboration links into the existing network, it is necessary to recognize the organizations and agencies possessing the authority and power to make changes to approximate the management of governance systems with socio-ecological interactions and operationalize transitions to adaptive co-management forms of governance.

Our results also point to various organizations and agencies have higher eigenvector centrality values than others in the Galapagos small-scale fishing governance system network (Fig. 8 and Table 1). We consider this an important feature to recognize if we aim at aligning new actors with diverse technological, behavioral, financial, institutional, and informational resources, among other determinants of adaptive capacity, with said network. We argue that these organizations and agencies are influential and well-positioned, not so much for the number of organizational links that they send and receive, but because of their connections to organizations and agencies with higher centrality values than others in the Galapagos small-scale fishing governance system. This means that these organizations and agencies may serve as channels of communication to reach other organizations and agencies often in charge of the decision-making structures of the governance network, facilitating the creation of links between external stakeholders and decision-making actors. We claim that this access might lead to governance arrangements and the formation of new organizational links that facilitate the connection between local priorities and international, regional and national levels of management.

Our outcomes also indicate that diverse organizations and agencies within the Galapagos small-scale fishing governance system network have higher closeness values than others (Fig. 9 and Table 1). We argue that this is a good sign for collaboration and the diffusion and incorporation of adaptive capacity determinants into the network, as these organizations and agencies are closer to any others in the network. From a governance perspective, reaching all other actors more rapidly implies that the incorporation and diffusion of ideas, financial resources and technical solutions might occur more quickly and more efficiently in the network. This is significant considering that approximating a governance fit partially depends on the capacity of governance systems to act in time (Cumming et al. 2006; Epstein et al. 2015; Alexander et al. 2017). Recognizing that the capacity of governance systems to achieve such a fit has been gradually reduced due to the growing human and ecological interactions spanning governance systems is needed in managing common-pool resources like the Galapagos small-scale fisheries. Recently this has been evidenced more explicitly as governance systems have been struggling with measures and strategies to limit the spread of the COVID-19 virus and cope with the associated socio-economic and public health fallout. Therefore, evaluating organizations and agencies closer to all in the network might signify acting faster in crisis and delivering rapid responses in the Galapagos small-scale fishing governance system network.

Although we found no strong evidence of mutual interaction between organizations and agencies from the private sector (hypothesis 2), our ERGM outcomes suggest a propensity toward a cross-sectoral interaction network among various organizations and agencies in the Galapagos small-scale fishery system. We found evidence of this propensity toward mutual interaction among nodes of the public sector (hypothesis 1), and a significant, positive propensity of nodes from the private and public sectors to form organizational links in the Galapagos small-scale fishing governance system network (hypothesis 3). The latter, from our perspective, may be seen as a significant feature of analysis, bearing in mind the need for cross-sectoral interactions to deliver adequate policy-making solutions in the sector. We further noted positive and significant effects toward cross-sectoral open triadic network configurations (hypotheses 4, 5, and 6). We argue that the prevalence of these configurations in the network can be interpreted as a good sign for the evolution of cross-sectoral collaboration relationships within the Galapagos small-scale fishing governance system network. It is likely that the prevalence of a reciprocal relationship (A ↔ B) might further be developed into either an open triadic or a closed triadic network configuration. The propensity toward open triadic configurations might potentially lead to closed triad configurations if organizations and agencies deem that the participation of a third party (C) could contribute to the achievement of common institutional goals and collective actions for governing a shared natural resource, through more densely clustered relations of collaboration.

According to our qualitative data analysis, diverse organizations, and agencies with no strong presence in the Galapagos small-scale fishing governance system may collaborate within the network through various means. This includes contributions in the form of technical assistance, equipment, information and training capabilities, and local fisheries knowledge. The willingness to collaborate is speculative, and our observations in this regard ignore the role of power and the level of trust required among organizations and agencies to cement collaborative partnerships. However, we argue that these results demonstrate that additional alliances and collaboration may emerge in the network, transforming it into a more densely clustered collaboration network. Well-positioned organizations and agencies in the network, such as CGREG, DPNG, fishing cooperatives, and CDF, can play an important role in creating a more collaborative network because they possess ties to other governmental organizations, NGOs, funding, academic and research institutions, and local resource users.

Limitations and Future Directions

Our study coincided with the Coronavirus disease 2019 (COVID-19) pandemic, restricting nearly all in-person interactions; as a result, reaching organizations' representatives and officials to be included in the study was a challenging endeavor. Therefore, in the future there remains room for this paper's outcomes to be expanded in scope. This can be accomplished by integrating other organizations and agencies at diverse geographical scales into our analysis, as well as administrative levels and organizational links that this study may have missed. Furthermore, this paper may serve as a guide for future theoretical frameworks geared toward exploring further network configurations of the Galapagos small-scale fishery governance system. For example, there is clearly a need to examine the propensity toward triadic network configurations (i.e., interactions and links between the three nodes A, B and C) and investigate further hypotheses considering actors' attributes (e.g., hypotheses regarding trust between nodes, a central feature that drives stakeholders to engage in collaboration and choose collaboration partners) (Turner et al. 2016; Baldwin et al. 2018; Bodin et al. 2020; Lubell and Morrison 2021). Further, while we deem polycentric governance arrangements attractive to create and deliver solutions to the various socio-ecological problems affecting the Galapagos small-scale fishing sector, we also recognize that understanding the manifestations of power and its influences is critical to fostering collaboration among multiple actors within the Galapagos small-scale fishing governance system. Conflicts usually emerge in polycentric governance arrangements because of conflict of interest and resource access inequality, increasing polarization among stakeholders and obstacles to forming collaborative partnerships between higher and lower administrative levels (Mudaliar 2020; Mudliar and O'Brien 2021). Therefore, we suggest that future investigations evaluate the role of power dynamics in the governance of the Galapagos small-scale fishery system, which is an aspect that our research does not address. By no means the inclusion of multiple organizations and agencies across various administrative levels and geographical scales will be sufficient to enhance collaboration and functionality within the Galapagos small-scale fishing governance system (Biddle and Baehler 2019). Additional research efforts are needed to unveil the power dimensions of the Galapagos small-scale fishing governance system. The transition to a new Galapagos governance system regime, which is currently being amended, will most likely redistribute responsibilities and decision-making power, potentially leading to recentralization pathways and monocentric governance arrangements. Thus, we suggest exploring the power dynamics of the Galapagos small-scale fishing governance system based on the typology of power proposed by Morrison et al. (2019). These authors define three dimensions of power: power by design, pragmatic power and framing power. Based on this research approach, it will be possible to elucidate the concentration of power within the Galapagos small-scale fishing governance system network. Such knowledge is fundamental for improving the collaborative ties in the Galapagos small-scale fishing governance system, marking a critical step in addressing the complex socio-ecological problems that hinder the sustainable development of the Galapagos small-scale fisheries.

Conclusions

Since Elinor Ostrom's publications, there has been a significant rise of scientific interest in polycentrism in the literature on complex social-ecological systems. However, to our knowledge, the number of studies in the Galapagos Islands aimed at improving marine resource management of complex social-ecological systems, considering social network approaches and polycentric governance arrangements, is still limited. Addressing simultaneous wicked problems, such as public health, socio-economic, environmental, institutional and climate issues, requires a multi-level approach across different scales. This study, therefore, proposes that the Galapagos small-scale fishing governance system should explore more polycentric approaches to governance, including linkages (partnerships) spanning multiple scales and levels, from global to local, relying on formal and informal networks. More polycentric ties in the sector might contribute to creating the correct links at the right time in light of multiple drivers of change (Olsson et al. 2007; Carlisle and Gruby 2019; Lubell and Morrison 2021). Complex social-ecological systems, like the Galapagos small-scale fishing sector, need to embrace a social-ecological perspective involving different sorts of information, skills, and stakeholders, at different scales and levels. This would enable the sector to approximate as closely as possible the governance scope required to handle the multiple social-ecological dynamics in the archipelago and prevent a misfit. By no means are we suggesting that the state should cede control over marine resources in the Galapagos. We do, however, consider that the multiple social-ecological interactions that comprise the sector require the cooperation and collaboration of multi-scale and multi-level organizations to deal with the multiple drivers of change, particularly in these current times of constant change und uncertainty. Without question, the adverse effects of the COVID-19 pandemic on the social-economic situation of the Galapagos population, together with the difficulties controlling illegal international fishing within the Galapagos Marine Reserve protected area, highlight the need to create an adaptive capacity based on a polycentric governance network. Systems with high adaptive capacity are those most capable of reconfiguring themselves when subjected to shocks (Folke et al. 2005). Therefore, this paper might guide practitioners and decision-makers to explore further organizational links and network configurations, allowing for the development of collaboration strategies to cope with the various multidimensional problems faced by the Galapagos small-scale fishing system.

We contend that the gauging of nodes' positions, features, and needs can enable actors within governance systems to better discern among collaborative partnerships from which to choose, rather than relying on chance or policies and laws to define collaboration ties. In our view, this argument contributes to the discussion analyzing polycentric arrangements by implying that, rather than being arbitrarily forced to adjust to polycentric structures, actors can do so voluntarily because it helps them to consolidate strategic alliances considering mutual goals and concerns (Stephan et al. 2019; Lubell and Morrison 2021). Notably, we argue that the insights presented in this study contribute to elucidating the notion of institutional fit, initially explored by Young (2002). It is significant to consolidate the idea that the concept of fit in common-pool resources depends on governance systems' ability to fit in with environmental and ecological concerns, but also on their ability to fit in with various global sustainability challenges and stakeholder expectations (Acton et al. 2021; Ishihara et al. 2021; Lubell and Morrison 2021). Finally, we see our research as a timely study that might open discussions in the ongoing reformulation of the GSL—bearing in mind that the distribution of functions and power in the Galapagos Islands centers around the guidelines and policy decisions established under the GSL. COVID-19 is a new driver of change in the Galapagos that has led to the archipelago's worst-ever socio-economic scenario and the need to explore new ways to address various issues beyond environmental and ecological concerns. In this context, we consider the insights presented in our study to have usefully introduced governance-related insights hardly explored among the related public and political discussions in the Galapagos.

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

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