



The relationship of social capital and fishers' participation in multi-level governance arrangements



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ABSTRACT

The need for effective multi-level governance arrangements is becoming increasingly urgent because of complex functional interdependencies between biophysical and socioeconomic systems. We argue that social capital plays an important role in such systems. To explore the relationship between social capital and participation in resource governance arenas, we analyzed various small-scale fisheries governance regimes from the Gulf of California, Mexico. The components of social capital that we measured include levels of fishers' structural ties to relevant groups and levels of trust in different entities (i.e. cognitive component). We collected data using surveys and interviews with residents of small-scale fishing communities adjacent to marine protected areas. We analyzed the data using a logistic regression model and narrative analysis. The results of our quantitative analysis highlight the multidimensional nature of social capital and reveals complex relationships between different types of social capital and fisher participation in monitoring, rulemaking and MPA design. Furthermore our qualitative analysis suggests that participation in fisheries conservation and management is not fully potentialized due to the social and historical context of participatory spaces in Mexico.

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1. Introduction

Common-pool resource (CPR) theory argues that local resource users are capable of sustainably managing resources such as fish, irrigation systems, and forests (Ostrom 1990; Bromley, 1992). A large number of studies conducted over the last 30 years strongly support this hypothesis (e.g., Basurto, 2008; Chhatre and Agrawal, 2008; Cox et al., 2010); although the likelihood that local groups manage to self-organize to sustainably govern natural resources appears to depend upon a complex interplay between social, ecological and institutional factors. Indeed, because of the interdependent nature of biophysical and socioeconomic conditions across multiple scales and levels, there is a need for a better understanding of how successful governance regimes might manage these interdependencies (Cash et al., 2006; Brondizio et al., 2009; Jones et al., 2011).

Multi-level governance arrangements are especially relevant for marine fisheries, where conventional strategies often prove inadequate (Crowder, 2005; Degnbol et al., 2006) due to the high

levels of uncertainty and complexity involved in managing them (Wilson, 2006, 2007). Conventional tools such as spatial/temporal fishing restrictions, quotas, and gear limits can fail when uniformly applied to large areas that neglect important differences in social and ecological conditions. By adopting a multi-level structure, rule-making authority can be dispersed across multiple jurisdictions, and take a variety of specific forms (Hooghe and Marks, 2003). Regardless of the form adopted, it is crucial for multiple actors and especially resource users to be actively involved in decision-making processes (Eckerberg and Joas, 2004; Ho et al., 2012). This study begins by making the assumption that successful environmental governance likely depends upon the participation of resource users; and then considers factors that might influence their participation in diverse governance activities. Most notably the importance of social capital in driving participation and the sustainable management of marine resources has been well established (Gilmour et al., 2011; Marín et al., 2012). This study further contributes to this literature by (1) recognizing the multi-level structure of formal and informal governance systems and then (2) assessing the relationship between several distinct dimensions of social capital and participation in multi-level governance activities.

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1.1. Theoretical grounding

1.1.1. Multi-level governance arrangements

Multi-level governance is defined as “institutional arrangements that facilitate the coproduction, mediation, translation, and negotiation of information and knowledge within and across levels” (Brondizio et al., 2009, p. 255). Multi-level governance arrangements, such as fisheries co-management can facilitate power-sharing, build trust, provide support for institutions and improve problem-solving (Pomeroy and Berkes, 1997; Singleton, 2000; Carlsson and Berkes, 2005). However, the robustness of these systems depends on mutual recognition and coordinated action from both government entities and local actors (Pomeroy and Berkes, 1997; Yandle, 2003). When cross-scale linkages are lacking, governance systems can quickly collapse, as in the case of a shellfish fishery in the Gulf of California (Cudney-Bueno and Basurto, 2009). Micro-institutional analysis is therefore used to evaluate the robustness of governance systems by considering the role and contributions of actor groups to three distinct, but related situations of interdependent choice at the operational, collective-choice, and constitutional levels (Kiser and Ostrom, 2000). Pinkerton (2003) argues that effective fisheries co-management is predicated on cross-scale linkages across these levels. When local actors, such as fishers, or their representatives, cannot access higher levels where rules that structure decision-making process are created, multi-level arrangements are more likely to fail.

The relationship between operational, collective-choice, and constitutional levels relates to the nestedness of rulemaking authority in social systems (Ostrom, 2005). At the operational level fishers make individual decisions regarding resource use and undertake governance activities such as monitoring and sanctioning. At the collective-choice level actors, potentially comprised of those same fishers or their representatives make decisions about the type and structure of rules that will apply to appropriation situations (i.e. catch limits, gear restrictions, and licensing). This is mostly conducted within formal settings such as a council meeting; although it can also occur in more informal settings, such as a local bar or fisher’s home. At the constitutional level, actors determine who holds authority to create rules, and how rules might be chosen in councils or informal meetings. In general changes to rules tend to be more difficult and less frequent as one moves from the collective-choice to constitutional level (Kiser and Ostrom, 2000; Ostrom, 2005). In some instances there might be constraints imposed at higher levels that prevent resource users from participating in processes at multiple levels, which limit their ability to make certain types of changes in the structure of rules for the use of marine resources.

1.1.2. Stakeholders’ participation in fisheries governance

Participation in fisheries governance is the “the behavioral manifestation of cooperation” (Lubell, 2004, p. 343); an important (but insufficient) condition for successful environmental governance. Participation of local actors in governance has been associated with improvements in community cooperation and compliance with rules (Pollnac et al., 2001; Dalton et al., 2012) and can lead to improved ecological resilience and acceptance of fisheries policies (Lopes et al., 2013).

Empirical research has shown that several structural social, economic and ethical factors influence the quality and nature of the participatory processes in resource management. Chen (2010) reports that a stewardship ethic might improve fishers’ participation in management even when economic incentives are lacking. In contrast, Brzezinski et al., 2010 found that voluntary participation in fisheries management favored individuals that lived closer to meeting venues and had a higher economic status. Social norms, such as caste structures in India can limit participation in

traditional fisheries management systems, which in the presence of rapidly changing demographic and ecological factors may reduce robustness (Coulthard, 2011). Exclusion of certain stakeholders may also be indicative of asymmetries in power and information which tend to favor certain subgroups at the expense of others (Singleton, 2000; Cooke and Kothari, 2001; Berkes, 2007). However one set of factors, namely social capital appears to have a considerable influence on the extent to which individuals and groups participate in the governance of natural resources across a wide range of different contexts (e.g., Pretty, 2003; Grafton, 2005).

1.1.3. Social capital in fisheries governance

During the last three decades, social capital has gained prominence throughout the social sciences (Bourdieu, 1986; Coleman, 1988; Burt, 1992; Putnam, et al., 1994; Fukuyama, 1995; Lin, 2001). Economists, sociologists, political scientists, and anthropologists started applying and analyzing this concept in various domains, which led to the production of different theoretical conceptualizations of social capital. These different views could be broadly separated into two distinct schools of thought on social capital (Nenadovic, 2015). The first school, epitomized by James Coleman and Robert Putnam (Coleman 1987, 1988; Coleman, 1990; Putnam et al., 1994; Putnam, 2000), sees social capital as a combination of structural (i.e. networks) and cultural components (i.e. trust, norms of reciprocity). In contrast the second school pioneered by Ronald Burt and Nan Lin (Burt, 2000; Lin, 2001; Lin et al., 2001) sees social capital as a set of resources embedded within social networks that present structural opportunities or constraints for actors depending upon their position within those networks. For those authors, social capital has the general character of a private good, and thus does not include the concepts of trust and norms of reciprocity, which are viewed as a public good; generating benefits for all members of a community.

Our treatment of social capital is closely aligned with the former, rather than the latter school of thought. We define social capital as an attribute of actors composed of social ties to other individuals or groups, and the extent to which those ties are characterized by norms of reciprocity and trust (Putnam et al., 1994; Pretty, 2003). From this perspective social capital can be viewed as a multidimensional concept that represents characteristics of individuals and their social relationships, which affect the likelihood of cooperation. As such it can be separated into two related components: structural and normative (Uphoff, 2000; Grootaert et al., 2004). The structural component of social capital refers to social network relationships among actors within a given system. Relationships among individuals with similar demographic characteristics, such as family members, neighbors, and close friends, are referred to as “bonding” social capital; relationships among individuals that differ in these characteristics but live in proximity to each other are referred to as “bridging” social capital (Gittel and Vidal, 1998; Grootaert et al., 2004). Furthermore, networks that emphasize the relationships among individuals that differ in their positions of authority, for example between local fishers and local, regional, or national public officials, are referred to as “linking” social capital (Grootaert et al., 2004). On the other hand, normative, or cognitive forms of social capital is comprised of trust, trustworthiness and shared values, which are also separated based on the strength or types of the relationship into bonding, bridging, and linking.

Research has shown that in general social capital tends to increase stakeholders’ participation in natural resource management across different systems, such as forests, watersheds, agricultural land, and fisheries (Uphoff and Wijayaratra, 2000; Pretty and Smith, 2004; Djamhuri, 2008; Ohno et al., 2010; Gutiérrez et al., 2011; Yandle et al., 2011). In the context of marine

resources, it has been argued that the structural and normative components of social capital play an important role in increasing the likelihood of sustainable management. In a Chilean co-management system for benthic fisheries, organizations with higher bridging and linking social capital were correlated with higher management capacity and more diversified livelihood strategies (Marín et al., 2012). Meanwhile in India, Sekhar (2007) found that the existence of networks and trust within and among fishing groups facilitated the creation and maintenance of a locally designed rule system. However, in this case, a lack of linking social capital prevented coordination between state agencies and informal governance entities. The absence of such coordination did not impact the resource negatively because compliance with locally designed rules was high, but the importance of such linkages appears to rise as levels of non-compliance increase. For instance, a network of community-based MPAs in the Gulf of California collapsed as a result of poor relationships between resource users and state management agencies (Cudney-Bueno and Basurto, 2009). The role of the normative components of social capital has also been linked to improved efficiency in fisheries governance as higher levels of trust in fishing communities reduces the costs of monitoring and enforcement (Grafton, 2005). An analysis of five Australian abalone fisheries suggests that the success of industry-led resource management initiatives was the result of high levels of trust among the fishing groups (Gilmour et al., 2011).

1.2. Research questions

Whereas the literature on social capital in fisheries governance provides clear support for its general importance, we do not have a clear understanding of how the different components of social capital (i.e., bridging, bonding, and linking) relate to multi-level participatory governance. Studies reviewed in the previous section provide some evidence that stable networks (i.e., bonding social capital) play an important role in operational situations, while more open networks (i.e., bridging and linking social capital) become relevant for collective-choice and constitutional processes. In the context of Mexico this pattern would be somewhat expected as government retains rights for the formal management of marine resources in collective-choice and constitutional situations (Hernandez and Kempton, 2003; Cinti et al., 2010). However, in the absence of empirical tests, which control for the effects of diverse forms of social capital, the importance of bridging and linking social capital for fisher participation remains an open question.

In this paper we focus on the effects of different types of social capital on fishers' participation in multi-level governance

arrangements related to a small-scale fishery in the Gulf of California, Mexico. The interaction of fisheries and conservation policies across distinct federal and state government agencies facilitates study of multi-level governance arrangements within this region. We specifically seek to address the following question: What is the relationship of fishers' social capital and their engagement in multi-level governance activities? Given the multidimensional nature of social capital we hypothesize that (a) the importance of bonding social capital is more relevant to operational level activities while (b) the importance of bridging and linking social capital is more important at the collective-choice and constitutional levels (Fig. 1, Table 1)

2. Methods

2.1. Study sites

We conducted fieldwork in four locations along the Baja California peninsula (Fig. 2). More than 90% of commercial fishers in this region work in the small-scale fisheries sector (OECD, 2006). Fishers within this sector operate either as members of fishing cooperatives or as individual permit holders, although undocumented fishers (*pescadores libres*) are present (Leslie et al., 2015). A majority of the fishers employ more than one fishing gear, such as diving, gill nets, long-lines, traps, and/or hook and line, using a 6–8-meter fiberglass boats with outboard engines (Basurto et al., 2013; Leslie et al., 2015). They fish close to shore, and rarely go on multi-day trips. Catches in our study sites is composed on average of 50 species, including finfish and elasmobranchs, gastropods, bivalves, and crustaceans (Erisman et al., 2011). Each site has a marine protected area (MPA) within its fishing grounds. Furthermore, each MPA has a designated no-take zone in which extraction of marine resources is prohibited. Most MPAs in the region were established as a response to unsustainable fishing practices (Rife et al., 2013), which have been recognized as a major threat to the stability and health of the ecosystem (Sala et al., 2004; Saenz-Arroyo et al., 2005).

2.2. Background of fisheries governance in Mexico

All fisheries in Mexico are largely managed by federal government entities. The main body responsible is the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), which manages fisheries through its two decentralized entities: the National Commission for Aquaculture and Fishing (CONAPESCA) and the National Fisheries Institute (INAPESCA). CONAPESCA is responsible for managing and enforcing fisheries regulations, while INAPESCA collects and analyzes fisheries and

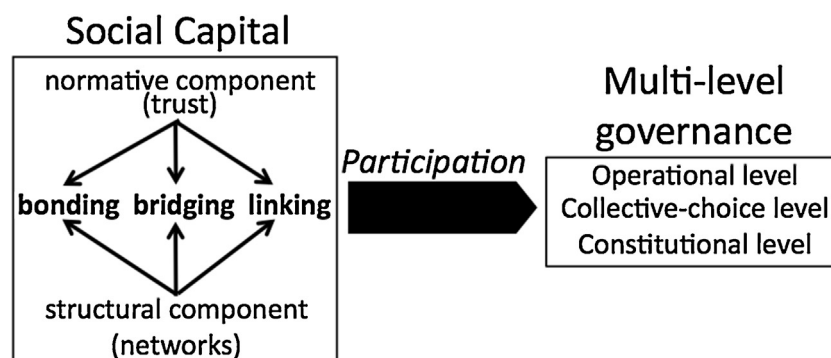


Fig. 1. Theoretical model guiding this study.

Table 1
Characteristics of social capital components investigated in this study.

Social capital component	Construct	Operationalization of a construct	Source of operationalization ^a	Expected effect	Observed effect
Structural-bonding	Relatively stable and closed social networks such as among family members and close friends.	Consists of fishers' membership to informal fishing groups or fishing cooperative. ^c	(Bodin and Crona 2008; Ohno et al., 2010; Jicha et al., 2011; Holland et al., 2013)	Related to participation in operational level activities	Fully supported
Structural-bridging	Relatively fluid and open social networks such as among members in organizations and clubs – horizontal ties.	Consists of fishers' participation in capacity building or research project activities.	(Bodin and Crona 2008; Holland et al., 2013)	Related to participation in collective-choice and constitutional level activities	Partially supported
Structural-linking	Social networks that exist among power differentials, such as public officials and fishers – vertical ties.	Fishers voting in the last general election (held on July 1, 2012).	Not available ^b	Related to participation in collective-choice and constitutional level activities	Not supported
Cognitive-bonding	Individual fisher's trust in the members of this type of social network: family members and close friends.	Fishers' trust in cooperative members and independent fishers. ^c	(Sekhar 2007; Ohno et al., 2010; Jicha et al., 2011; Holland et al., 2013)	Related to participation in operational, collective-choice, and constitutional level activities	Partially supported
Cognitive-bridging	Individual fisher's trust in the members of this type of social network: other participants in organizations and clubs.	Fishers' trust in fish buyers, tourism operators, and federations of cooperatives.	(Sekhar 2007; Ohno et al., 2010; Yandle et al., 2011; Holland et al., 2013)	Related to participation in collective-choice and constitutional level activities	Partially supported
Cognitive-linking	Individual fisher's trust in the members of this type of social network: public officials.	Fishers' trust in federal and local government bodies.	(Sekhar 2007; Yandle et al., 2011; Holland et al., 2013)	Related to participation in collective-choice and constitutional level activities	Not supported

^a Indicate studies that operationalized a particular construct in a similar or identical manner. Some differences in operationalization are due to variation in a local context among the studies. Not all studies investigate social capital within fisheries.

^b This operationalization was developed for this study based on a notion that voting in elections represent one of the main elements of civic engagement (Theiss-Morse and Hibbing, 2005). As such, this particular form of political participation can be seen as a form of social capital (Keele, 2007; Mendoza-Botelho, 2013).

^c Both formal (cooperatives) and informal fishing groups in our study sites are largely kinship based. In terms of cooperatives, our data show that approximately 70% of their members are related by kin.

biological data, which are then used to further modify regulations. Apart from these agencies, Mexican fisheries are also influenced by regulations enacted by the Secretariat of Environment and Natural Resources (SEMARNAT). It regulates the harvest of at-risk species and through the National Commission of Natural Protected Areas (CONANP, 2014) manages implementation and operation of MPAs. In addition to the federal entities, state agencies and stakeholders (i.e. fishers) contribute to fisheries management through participation in public hearings, councils and committees. The rights of stakeholders' to participate in fisheries governance processes is defined by two laws: the General Law of Ecological Equilibrium and Environmental Protection (LGEEPA, 1996) and the General Law of Sustainable Fisheries and Aquaculture (LGPAS, 2007). The close coupling among the two secretariats and the state entities and stakeholders requires them to cooperate in and coordinate fisheries management efforts.

2.3. Data collection

We used a mixed methods approach, collecting data through structured surveys and semi-structured interviews. Joint application of qualitative and quantitative research instruments produces more robust findings by allowing better understanding of research questions that would not be possible if either approach were used alone (Creswell and Clark, 2007). We performed 544 surveys with SSF fishers (referred to as respondents) and 82 in-depth interviews with fishers; government officials from a number of federal institutions that regulate fishing activities or manage protected areas; and NGO staff that were active in the creation and implementation of the local MPA (referred to as informants). Structured surveys were used to collect quantitative data while semi-structured interviews for the collection of qualitative data.

Data collection techniques and procedures were approved by the Duke University's IRB (permit #B0259). More information on the data collection approach can be found in the Supporting Information document (Section 1.1).

2.4. Variable description and operationalization

We measured dependent variables as binary variables (Table 2): fisher participation in operational, collective-choice, and constitutional situations as defined by the literature on institutional analysis (Kiser and Ostrom, 2000; Ostrom, 2005) (Table 2). At the operational level, we record whether fishers' participated in formal or informal surveillance of their peers during the prior year and filed a complaint after witnessing an illegal activity. Complaints could be filed in writing or by calling the appropriate authority. The responses for these two components were merged into a single binary variable. We used fishers' participation in councils and committees that deal with fisheries issues as a proxy for participation in collective-choice situations. These bodies either propose the creation of new rules or suggest the modification of existing ones. For the constitutional level, we used fishers' participation in the establishment of the local MPA or the development of its management plan. MPA management plans specify the creation of councils and committees to manage the MPA and as a result structure the opportunities that actors face in collective-choice situations as they seek to modify rules.

In regards to independent variables, we operationalized social capital by first distinguishing between its structural and cognitive components, and then distinguishing among the bonding, bridging, and linking aspects of each (Ohno et al., 2010). This approach gave us six distinct measurements of social capital (Tables 1 and 2). The structural component is measured by

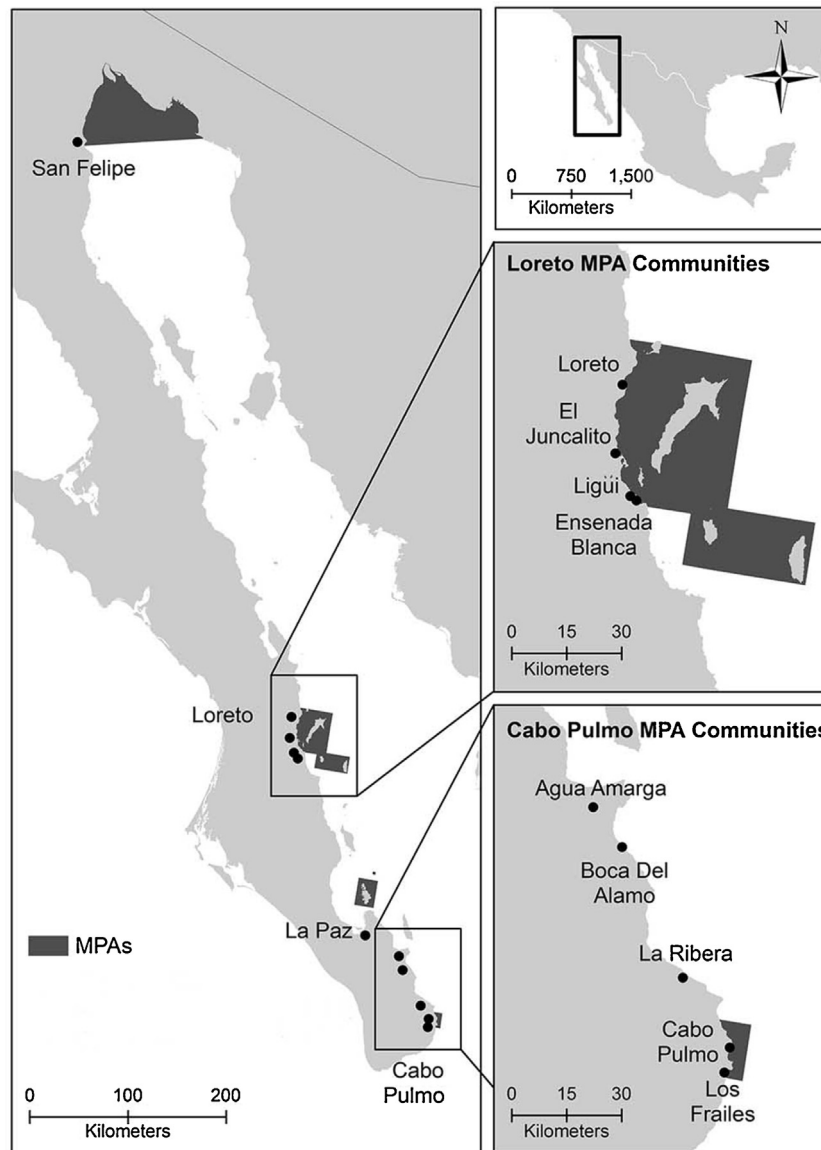


Fig. 2. Research sites along the Baja California peninsula. From North to South: San Felipe, Loreto, La Paz, and Cabo Pulmo. Loreto and Cabo Pulmo sites contained multiple fishing communities.

considering whether a fisher participates in informal and formal organizations. The difference between types and nature of participation is used to distinguish among the following three aspects. Structural-bonding social capital is measured by considering whether a fisher is a member of an informal fishing group or fishing cooperative. This aspect of social capital indicates whether a fisher is part of a relatively stable social network of other fishers. Structural-bridging social capital records whether a fisher participated in capacity building and research project activities over the prior year and indicates ties to more distant social networks. Structural-linking social capital, on the other hand, indicates whether a fisher voted in the most recent general election (held on July 1, 2012). Given that voting in elections represent one of the main elements of civic engagement (Theiss-Morse and Hibbing, 2005), this particular form of political participation can be used as a general proxy for fishers' interactions with actors with

power and authority. The cognitive dimensions of social capital are based on fishers' trust in actors or organization. We used a five-point Likert scale to assess the following question: "There are many different organizations involved in fisheries and fisheries management, ranging from the federal government to your neighboring cooperatives and NGOs. In general, when thinking about each listed organization, would you say you completely trust them, trust them, distrust them, completely distrust them, or are you somewhere in between?" Trust is one of the most widely used measurements of social capital and is included in many standardized survey instruments, such as the General Social Survey, the World Values Survey, and the Eurobarometer Survey (Putnam, 2000; Glaeser et al., 2002; Menzel et al., 2013). Cognitive-bonding social capital is measured by considering fishers' level of trust towards other fishers. Cognitive-bridging social capital refers to fishers' trust in fish buyers, tourism operators, and federations of

Table 2
Summary of variables.

Variable	Operationalization	Measure	Mean	SD	Min	Max
Response variables						
Participation-Operational level	Respondents (A) participation in surveillance activities during the prior year and (B) file a complaint after witnessing an illegal activity. Responses pooled.	Binary: (Yes/No)	0.253	0.435	0	1
Participation-Collective-choice level	Respondents participation in various councils and committees that deal with fisheries issues	Binary: (Yes/No)	0.272	0.446	0	1
Participation-Constitutional level	Respondents participation in the development of a new regulatory framework related to a local MPA	Binary: (Yes/No)	0.117	0.322	0	1
Explanatory variables						
Structural-bonding	Consists of fishers' membership to (A) informal fishing groups or (B) fishing cooperative. Responses pooled.	Binary: (Member/Not member)	0.785	0.412	0	1
Structural-bridging	Consists of fishers' participation in (A) capacity building or (B) research project activities. Responses pooled.	Binary: (Participated/Did not participate)	0.309	0.463	0	1
Structural-linking	Respondent's voting in the last general election (held on July 1, 2012).	Binary: (Voted/Did not vote)	0.849	0.359	0	1
Cognitive-bonding	Respondents trust in (A) cooperative members and (B) independent fishers. Response pooled.	Ordinal: 5-point Likert scale (Completely trust/Completely distrust) Rescaled to vary between zero and one.	0.330	0.167	0	0.875
Cognitive-bridging	Respondents trust in (A) fish buyers, (B) tourism operators, and (C) federations of cooperatives. Responses pooled.	Ordinal: 5-point Likert scale (Completely trust/Completely distrust). Rescaled to vary between zero and one.	0.442	0.212	0	1
Cognitive-linking	Respondents trust in (A) CONAPESCA, (B) PROFEPA, and (C) local government bodies. Responses pooled.	Ordinal: 5-point Likert scale (Completely trust/Completely distrust). Rescaled to vary between zero and one.	0.448	0.206	0	1
Years fishing to age ratio	Respondent's fishing experience	Continuous	0.599	0.182	0.04	0.91
Education	Respondent's years of formal education.	Continuous	6.887	2.892	0	16
Other income	Respondent reliance on more than one income-generating activity	Binary (Yes/No)	0.313	0.465	0	1
Number of resources fished	Respondent's list of resources fished.	Continuous	3.936	1.794	1	10
Nets	Respondent's main fishing gear	Binary: (Lives/Does not live)	0.347	0.477	0	1
La Paz		Binary: (Lives/Does not live)	0.147	0.355	0	1
Loreto	Respondent's place of residence	Binary: (Lives/Does not live)	0.332	0.472	0	1
Cabo Pulmo		Binary: (Lives/Does not live)	0.298	0.458	0	1

cooperatives. Finally, cognitive-linking social capital measures the extent to which fishers trust government agencies that engage in fisheries management (CONAPESCA, PROFEPA, local government).

Controls were included in statistical models to account for potentially intervening factors. We controlled for *site*, *years of education*, and the *number of income-generating activities* that each respondent engages in. In addition to these we included a number of variables related to fishing practices. The *years fishing to age ratio* is a proxy for respondents' experience as a fisher. *Number of resources fished* provides some indication as to a respondents' potential for diversification within a fishery. *Principal fishing gear* records the respondents' preferential mode of harvesting.

2.5. Analysis

We used logistic regression to estimate the likelihood of fisher's participation in operational, collective-choice, and constitutional activities. Logistic regression is used to evaluate the relationship between a vector of independent variables and a binary dependent variable (Long, 1997). Although the resulting coefficients indicate the relationship between each individual variable and an outcome of interest, the probability of that outcome depends upon the values of the other variables included in the model. Therefore in addition to reporting the model coefficients we include additional figures to demonstrate the relationship between different types of social capital and the likelihood of particular outcomes, while holding all other variables at their respective sample mean.

3. Results

3.1. Quantitative results

The results of the three logistic regressions are presented in Table 3. Count r-squared values provide a general indication of model fit by reporting the number of cases correctly assigned by each model. All models correctly classify over three-quarters of the observations; performing best with respect to participation in the design of the MPA management plan (constitutional level situation), and worst with respect to social monitoring (operational level situation).

The overall results indicate that different types of social capital affect outcomes differently. More specifically, none of the individual types of social capital are consistently associated with any of the three outcomes (Table 3). Structural bonding social capital was positively associated with operational and constitutional level outcomes. For instance, the probability of participation in operational level activities increases by 12.6% for individuals that are members of a fishing group or cooperative (i.e. structural bonding social capital). Cognitive bonding social capital, on the other hand, was positively associated with fishers' participation in collective-choice and constitutional level activities. Fig. 3 plots the predicted probability of these two outcomes as a function of trust in other fishers. The likelihood that a fisher participated in constitutional and collective choice situations increases with

Table 3
Results. Standard errors clustered by location (* $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$).

Variable	Participation-Operational level	Participation-Collective choice level	Participation-Constitutional level
Structural bonding	0.822*** (0.242)	0.301 (0.587)	0.834* (0.449)
Structural bridging	0.624 (0.594)	1.187*** (0.312)	0.052 (0.127)
Structural linking	0.587 (0.580)	0.705 (0.503)	0.299 (1.063)
Cognitive bonding	0.761 (0.866)	1.913*** (0.569)	1.926*** (0.710)
Cognitive bridging	-0.203 (0.695)	-0.790 (0.686)	2.400* (1.379)
Cognitive linking	0.301 (1.086)	-0.206 (0.717)	-1.579 (1.229)
Years fishing to age ratio	1.839 (1.371)	-0.891* (0.513)	-0.647 (0.859)
Education	-0.023 (0.111)	-0.022 (0.045)	-0.186*** (0.062)
Other income	0.062 (0.111)	-0.469** (0.202)	0.548** (0.277)
Number of species fished	0.101*** (0.037)	0.182 (0.231)	-0.151 (0.092)
Gear type: nets	-1.309* (0.729)	0.189 (1.038)	0.236 (0.939)
La Paz	-1.257** (0.628)	1.580 (1.063)	-0.027 (1.078)
Loreto	1.180* (0.710)	1.250 (1.074)	-0.694 (0.978)
Cabo Pulmo	1.168 (0.733)	0.021 (0.897)	1.401 (1.028)
Constant	-2.842** (1.202)	-3.080*** (0.797)	-1.422 (1.565)
Model statistics			
N	265	265	265
Pseudo-R2	0.082	0.153	0.105
Log-likelihood	-137.529	-131.285	-85.578
Count R2	0.762	0.785	0.891

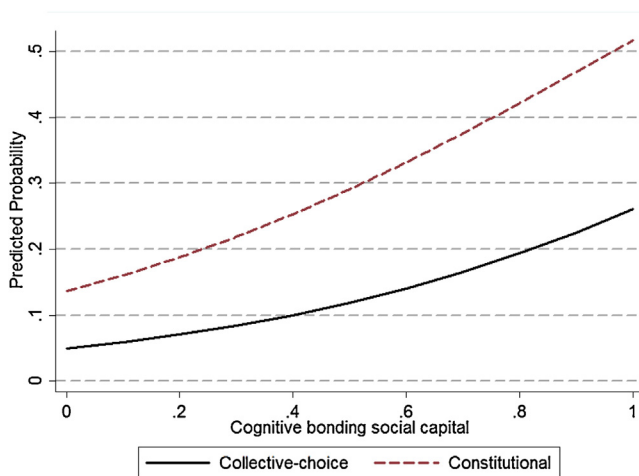


Fig. 3. Predicted probability of participating in collective choice and constitutional level activities as a function of cognitive bonding social capital (respondents trust in (A) cooperative members and (B) independent fishers). Both relationships are significant at $p \leq 0.01$ (see Table 1).

increasing level of trust; although the effects are more pronounced in the context of the constitutional situation.

The structural bridging component of social capital was associated with a greater likelihood of fisher's participation in collective-choice level arenas; while cognitive bridging social capital was only associated with participation in constitutional level activities. The one commonality among the models is that both structural and cognitive linking components of social capital have no impact on the likelihood of participation across the three levels.

3.2. Qualitative results

Whereas the statistical models demonstrate the relationship between social capital and fisheries governance; qualitative analysis revealed that social capital has been shaped by historical circumstances, as well as social identities and characteristics. Most informants (91%) indicated that there are ways for fishers to engage in fisheries management. However, 52% pointed out that these spaces are not fully potentialized, are seen as ineffective and/or lack credibility. Historical development of the Mexican political system largely precluded any form of public participation. Many of the informants suggested that paternalistic attitudes during most of the 20th century suppressed civic engagement in decision-making. Democratization efforts started in the 1990s and civic participation emerged as one of the fundamental components of a new governance approach. In the context of natural resource management all of the interviewed government officials recognized that the approach in which policies are enacted has changed considerably over the past 20 years. One of the officials stated:

Everything used to be decided in Mexico City. In 1973 there was a proclamation of the (Protected Area of Flora and Fauna) Cabo San Lucas. Anyone was informed? Nobody. In 1978 there was a proclamation of the (Protected Area of Flora and Fauna) Islands of the Gulf of California. Anyone was informed? I was a University professor and I didn't know. I found out six months later . . . (The problem is that) people still believe that decisions are solely being made in the central offices. Maybe this is what happened in the thirties, forties, fifties, sixties, seventies and eighties. But in more recent times the process is more open with more participation, more transparency and above all with a requirement to include as many stakeholders as possible. The politics of community participation today sounds like a normal exercise . . . We can do absolutely nothing anymore without social participation (G14).

While all government officials acknowledged that laws and regulations are in place that require them to solicit stakeholder input in natural resource management; they point out that meaningful participation is limited by the absence of a strong civic society and government capacity to manage participatory processes. As one informant suggested that participatory spaces will never be adequately used until broader societal issues are addressed:

On one hand] it's the lack of the culture of participation . . . And on the other hand it is a lack of government's promotion of, invitation to, and cooperation in (participatory activities) . . . Lack of these features is a defect; the fact that we don't know how to participate, we don't have good organization and representation. Because of that these and any new participatory spaces will hardly have an optimal or adequate social participation. In the end it has to do with being educated and accustomed to participate and to know how to do it (G27).

A lack of experience with participatory processes and general distrust in government creates a vicious circle impeding meaningful participation. For this reason, government officials recognize

the need for trust building as a necessary first step to improve fisheries governance. One respondent explained his approach in trust building in the following way:

From my experience it (building trust) is rooted in a personal interaction. There are certainly many laws but there is also friendship, cordiality, and closeness with the resource user. The goal is to get to know their feelings/opinions . . . And once they do not see you solely as a public servant, trust is expressed in a different way (G09).

Some trust building has occurred through recent government initiatives in fishing communities, such as community watch programs. This program is funded by the government and encourages participation of local actors in surveillance (CONANP, 2014 website). According to one government official who led this initiative, they serve as the “eyes on the ground” for the enforcement body, which facilitates their work and creates connections between government and local communities. However, some informants thought that this has led to conflict within the community, which can result in destruction of fishing gear or even in disruption of family ties. While some view such programs as a source of alternative employment opportunities for fishers, others point out that a sole emphasis on monitoring and enforcement without emphasis on other activities does not help solve the current situation.

4. Discussion

Our findings are consistent with prior studies suggesting that social capital plays a role with regards to fishers' participation in multi-level governance arrangements, but also suggest that the effects of different types of social capital vary across different types of governance activities. Furthermore by combining statistical models with qualitative interviews it would seem that the low levels of participation in multi-level fisheries governance arrangements might be linked to the social and historical context of public participatory processes in Mexico.

4.1. Limitations

Before turning to the implications of these findings, it is important to note key limitations of this study. First, the relationships observed in statistical models should not be construed as causal in nature. The dataset consisted of cross-sectional data and lacked strong instruments to account for potential endogeneity (Nakamura and Nakamura, 1998; Yandle et al., 2011). More specifically, several indicators of social capital used in this study might in fact be influenced by our dependent variables, posing difficulties for making strong unbiased estimates and inferences in our model. As a result, the results should be seen as providing potentially useful insights with regards to which dimensions of social capital might be more (or less) important in influencing individual fisher decisions to participate in the governance of marine resources; but require further empirical investigation using multiple methods of inquiry.

Second, our treatment of social capital as a multidimensional concept poses a number of different analytical and conceptual issues. While this is consistent with the literature on social capital that incorporates both cognitive and structural components (Grootaert et al., 2004; Sekhar, 2007; Ohno et al., 2010), there is a risk that our chosen measures fail to fully capture the specified constructs (Lin and Erickson, 2008). We therefore relied upon previous studies to select our measures to ensure their consistency; potentially making some sacrifices in terms of their validity (see Table 1).

4.2. Relationship between dimensions of social capital and fishers' participation across different governance levels

Although the different components of social capital seem to be generally relevant across the three levels of participation in multi-level governance arrangements, no single component of social capital was consistently influential across the three outcomes. This is consistent with findings from previous studies (Ohno et al., 2010; Albarracin and Valeva, 2011; Jicha et al., 2011) that emphasize the multidimensionality and complexity of social capital. For instance, Ohno et al. (2010) found that stakeholders' participation in watershed management initiatives depended upon structural bridging social capital for initiatives led by government agencies; while neighborhood-led initiatives were influenced more by structural bonding social capital. Similarly Jicha et al. (2011) observed that bonding forms of social capital such as membership in associations and interpersonal trust affected participation in collective action after a hurricane Grenada, while norms of reciprocity had no such effect.

Our results are broadly consistent with the hypothesis that structural bonding social capital increases the likelihood of participation in operational-level activities. Operational level activities in the context of small-scale fishing in Mexico are mostly done within kin-based groups (i.e. relatives fishing together). According to Basurto et al. (2016) approximately 70% of cooperative members in this region are kin, indicating a high potential for bonding social capital within these groups. However, participation at higher levels of fisheries governance is related to structural bridging and cognitive bonding at the collective choice level, and structural bonding, cognitive bonding, and cognitive bridging at the constitutional level. This suggests that linkages across dynamic social networks are more prevalent in collective-choice and constitutional level activities. This is also consistent with theoretical predictions and findings from other studies since engagement in such activities usually require participation of individuals beyond stable kin-based groups as they seek to resolve problems that often occur over larger spatial scales with more fluid membership (Ostrom, 2005; Ohno et al., 2010). For example, while investigating participation in watershed management in Japan, Ohno et al. (2010) found that the structural bonding component was more prominent in local management groups, while structural bridging was more important as the scale of organization increased. Similarly, Marín et al. (2012) concluded that successful fisheries co-management arrangements in Chile were correlated with bridging and linking social capital. These findings highlight the importance of both connections with other cooperatives (horizontal linkages) and with the government (vertical linkages) for effective multi-level governance. Although the presence of bonding and bridging social capital might be sufficient for effective resource management in communities that are spatially and/or financially isolated (Sekhar, 2007), it does not seem enough to provide the same outcome when such communities are connected to global markets or nearby communities with limited resources (Berkes, 1986; Cudney-Bueno and Basurto, 2009). In such cases linkages to government entities, as a form of linking social capital, seem to be of vital importance (Basurto and Ostrom, 2009).

The most surprising outcome of our analysis was that neither structural linking nor cognitive linking components of social capital appear to have impact on the likelihood of participation in multi-level governance arrangements. This finding is surprising because relationships between resource users and higher-level government officials are theorized to be an important form of social capital that lead to greater involvement of users in resource management (Grafton, 2005; Gilmour et al., 2011). However, it is possible that our measures fail to adequately capture this concept, and therefore further investigation of the relationship between

linking social capital and participation in fisheries governance is needed with particular emphasis on developing reliable and consistent measures of these concepts.

4.3. Putting participation into context

The findings from the qualitative component of our study reveal a systematic problem of participatory engagement that may hamper public contributions to governance activities. The apparent lack of a participatory culture in both political and non-political activities within Mexico has been well documented in the literature (Klesner, 2003, 2007; Albarracin and Valeva, 2011). For example, Mendoza-Botelho (2013) estimates that participatory engagements in political parties, professional associations, and community improvement organizations are among the lowest in Mexico when compared to five other Latin-American countries. Some of the authors attribute this to the seven-decade rule of the Institutional Revolutionary Party (PRI), which encouraged clientelistic behavior and corruption (Cornelius, 1975; Whitehead, 1994). Such practices could have resulted, as some of our informants indicated, in fishers' lack of experience and willingness to engage in participatory fora related to natural resource management.

The low levels of participation observed in this study persist despite a number of structural and regulatory changes over the last two decades that have tried to encourage public participation (LOAP, 1994; Cejudo, 2008). Although some scholars observed that there seems to be an increase in non-electoral participation over the last thirty years (Somuano Ventura, 2005), the situation in fisheries management does not appear to have changed. As Hernandez and Kempton (2003) conclude, government restructuring did not substantially increase fishers participation in the long run. Part of the problem could be a pervasive feeling of distrust in government by the Mexican people, which was evident from our interviews. However, this distrust did not appear to have a direct relationship with participation in our statistical models; but might still have an indirect influence. Given that some forms of social capital are created, transformed, and transmitted by government agencies and their policies (Rothstein and Stolle, 2002), the relationship between them should be taken into account. For example, a lack of public trust in government agencies and the perception of government corruption are, according to Morris and Klesner (2010), interrelated and mutually reinforced thus creating a vicious cycle that is difficult to break. Furthermore, the existing government apparatus is weakened by a presidential succession that occurs every six years, threatening political stability and the continuity of government policies (Whitehead, 1994). As Hernandez and Kempton (2003) point out, political dynamics in this system tend to lead towards the rejection of policies adopted by previous regimes and subsequent re-invention of governmental fisheries programs without any evaluation processes of prior programs and activities.

5. Conclusion

The results of our study suggest that both structural and normative components of social capital play a role with regards to participation in multi-level governance of marine resources, albeit to varying degrees. Furthermore, by combining our statistical results with qualitative analysis of the larger social and political context we are able to better understand the factors that seem to undermine participation despite supportive legislation and government policies. Our findings indicate that by identifying and targeting specific components of social capital communities and/or governments can promote and strengthen greater social inclusion in multi-level participatory fora related to fisheries

management in Mexico. Nonetheless, much more work is needed to better understand the relationship between different forms of social capital, participation and the sustainability of small-scale marine fisheries.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.envsci.2016.03.023>.

References

- Albarracin, J., Valeva, A., 2011. Political participation and social capital among Mexicans and Mexican Americans in Central Illinois. *Hispanic J. of Behav. Sci.* 33, 507–523.
- Basurto, X., Ostrom, E., 2009. Beyond the tragedy of the commons. *Economia delle Fonti di Energia e dell' Ambiente* 52, 35–60.
- Basurto, X., Bennett, A., Weaver, A.H., Rodriguez-Van Dyck, S., Aceves-Bueno, J.-S., 2013. Cooperative and noncooperative strategies for small-scale fisheries' self-governance in the globalization era: implications for conservation. *Ecol. Soc.* 18, 38.
- Basurto, X., Blanco, E., Nenadovic, M., Vollan, B., 2016. Integrating simultaneous prosocial and antisocial behavior into theories of collective action. *Sci. Adv.* 2.
- Basurto, X., 2008. Biological and ecological mechanisms supporting marine self-governance: the Seri callo de hacha fishery in Mexico. *Ecol. Soc.* 13, 20.
- Berkes, F., 1986. Local-level management and the commons problem: a comparative study of Turkish coastal fisheries. *Mar. Policy* 10, 215–229.
- Berkes, F., 2007. Community-based conservation in a globalized world. *Proc. Natl. Acad. Sci.* 104, 15188–15193.
- Bodin, Ö., Crona, B.I., 2008. Management of natural resources at the community level: exploring the role of social capital and leadership in a rural fishing community. *World Dev.* 36, 2763–2779.
- Bourdieu, P., 1986. The forms of capital. In: Richardson, J. (Ed.), *Handbook of Theory and Research for the Sociology of Education*. Greenwood, Westport, CT, pp. 241–258.
- Bromley, D.W. (Ed.), 1992. *Making the Commons Work: Theory, Practice, and Policy*. ICS Press, San Francisco.
- Bronzizio, E.S., Ostrom, E., Young, O.R., 2009. Connectivity and the Governance of Multilevel Social-ecological Systems: the role of social capital. *Annu. Rev. Environ. Resour.* 34, 253–278.
- Brzezinski, D.T., Wilson, J., Chen, Y., 2010. Voluntary participation in regional fisheries management council. *Ecol. Soc.* 15.
- Burt, R.S., 1992. *Structural Holes: the Social Structure of Competition*. Harvard University Press, Cambridge, MA.
- Burt, R.S., 2000. The network structure of social capital. *Res. Organ. Behav.* 22, 345–423.
- CONANP, 2014. Programa de Vigilancia Comunitaria (PROVICOM). http://www.conanp.gob.mx/rendicion_cuentas/transparencia_focalizada_provicom.php (accessed 12.07.2014.).
- Carlsson, L., Berkes, F., 2005. Co-management: concepts and methodological implications. *J. Environ. Manage.* 75, 65–76.
- Cash, D.W., Adger, W.N., Berkes, F., Garden, P., Lebel, L., Olsson, P., Pritchard, L., Young, O., 2006. Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecol. Soc.* 11, 1–11.
- Cejudo, G.M., 2008. Explaining change in the Mexican public sector: the limits of New Public Management. *Int. Rev. Adm. Sci.* 74, 111–127.
- Chen, C.-L., 2010. Factors influencing participation of 'top-down but voluntary' fishery management—empirical evidence from Taiwan. *Mar. Policy* 34, 150–155.
- Chhatre, A., Agrawal, A., 2008. Forest commons and local enforcement. *Proc. Natl. Acad. Sci.* 105, 13286.
- Cinti, A., Shaw, W., Cudney-Bueno, R., Rojo, M., 2010. The unintended consequences of formal fisheries policies: social disparities and resource overuse in a major fishing community in the Gulf of California, Mexico. *Mar. Policy* 34, 328–339.
- Coleman, J.S., 1987. Norms as social capital. In: Radnitzky, G., Berholz, P. (Eds.), *Economic Imperialism: The Economic Approach Applied Outside the Field of Economics*. Paragon House Publishers, New York, NY, pp. 133–155.
- Coleman, J.S., 1988. Social capital in the creation of human capital. *Am. J. Sociol.* S95–120.
- Coleman, J.S., 1990. *Foundations of Social Theory*. Harvard University Press, Cambridge, MA.
- Cooke, B., Kothari, U., 2001. *Participation: the new tyranny?* Zed Books.
- Cornelius, W.A., 1975. *Politics and the Migrant Poor in Mexico City*. Stanford University Press, Stanford, CA.
- Coulthard, S., 2011. More than just access to fish: the pros and cons of fisher participation in a customary marine tenure (Padu) system under pressure. *Mar. Policy* 35, 405–412.
- Cox, M., Arnold, G., Tomás, S.V., 2010. A review of design principles for community-based natural resource. *Ecol. Soc.* 15.
- Creswell, J., Clark, V., 2007. *Designing and Conducting Mixed Methods Research*. Sage Publications, Inc., Thousand Oaks.
- Crowder, L.B., 2005. Back to the future in marine conservation. In: Norse, E.A., Crowder, L.B. (Eds.), *Marine Conservation Biology: the Science of Maintaining the Sea's Biodiversity*. Island Press, Washington, pp. 19–29.

- Cudney-Bueno, R., Basurto, X., 2009. Lack of cross-scale linkages reduces robustness of community-based fisheries management. *PLoS One* 4, e6253.
- Dalton, T., Forrester, G., Pollnac, R., 2012. Participation, process quality, and performance of marine protected areas in the wider Caribbean. *Environ. Manage.* 49, 1224–1237.
- Degnbol, P., Gislason, H., Hanna, S., Jentoft, S., Raakjar Nielsen, J., Sverdrup-Jensen, S., Wilson, D.C., 2006. Painting the floor with a hammer: technical fixes in fisheries management. *Mar. Policy* 30, 534–543.
- Djambhuri, T.L., 2008. Community participation in a social forestry program in Central Java, Indonesia: the effect of incentive structure and social capital. *Agrofor. Syst.* 74, 83–96.
- Eckerberg, K., Joas, M., 2004. Multi-level environmental governance: a concept under stress? *Local Environ.* 9, 405–412.
- Erisman, B.E., Paredes, G.A., Plomozo-Lugo, T., Cota-Nieto, J.J., Hastings, P.A., Aburto-Oropeza, O., 2011. Spatial structure of commercial marine fisheries in Northwest Mexico. *ICES J. Mar. Sci.: Journal du Conseil* 68, 564.
- Fukuyama, F., 1995. Social capital and the global economy. *Foreign Aff.* 74, 89–103.
- Gilmour, P.W., Dwyer, P.D., Day, R.W., 2011. Beyond individual quotas: the role of trust and cooperation in promoting stewardship of five Australian abalone fisheries. *Mar. Policy* 35, 692–702.
- Gittel, R., Vidal, A., 1998. *Community Organizing: Building Social Capital as a Development Strategy*. Sage Publications, Thousand Oaks, CA.
- Glaeser, E.L., Laibson, D., Sacerdote, B., 2002. An economic approach to social capital*. *Econ. J.* 112, F437–F458.
- Grafton, R.Q., 2005. Social capital and fisheries governance. *Ocean Coast. Manag.* 48, 753–766.
- Grootaert, C., Narayan, D., Nyhan, V., Woolcock, J.M., 2004. *Measuring Social Capital: an Integrated Questionnaire*. 18. World Bank Publications, Washington D.C.
- Gutiérrez, N.L., Hilborn, R., Defeo, O., 2011. Leadership, social capital and incentives promote successful fisheries. *Nature* 470, 386–389.
- Hernandez, A., Kempton, W., 2003. Changes in fisheries management in Mexico: effects of increasing scientific input and public participation. *Ocean Coast. Manag.* 46, 507–526.
- Ho, T.V.T., Cottrell, A., Valentine, P., Woodley, S., 2012. Perceived barriers to effective multilevel governance of human-natural systems: an analysis of Marine Protected Areas in Vietnam. *J. Political Econ.* 19, 17–35.
- Holland, D.S., Kitts, A.W., Pinto Da Silva, P., Wiersma, J., 2013. Social capital and the success of harvest cooperatives in the New England groundfish fishery. *Mar. Resour. Econ.* 28, 133–153.
- Hooghe, L., Marks, G., 2003. Unraveling the central state, but how? types of multi-level governance. *Am. Political Sci. Rev.* 97, 233–243.
- Jicha, K.A., Thompson, G.H., Fulkerson, G.M., May, J.E., 2011. Individual participation in collective action in the context of a Caribbean island state: testing the effects of multiple dimensions of social capital. *Rural Sociol.* 76, 229–256.
- Jones, P.J.S., Qiu, W., De Santo, E., 2011. Governing marine protected areas: getting the balance right. Technical Report DEP/1379/NA. United Nations Environ. Prog.
- Keele, L., 2007. Social capital and the dynamics of trust in government. *Am. J. Political Sci.* 51, 241–254.
- Kiser, L.L., Ostrom, E., 2000. The three worlds of action: a metatheoretical synthesis of institutional approaches. In: McGinnis, M.D. (Ed.), *Polycentric Games and Institutions: Readings from the Workshop in Political Theory and Policy Analysis*. University of Michigan Press, pp. 56–88.
- Klesner, J.L., 2003. Political attitudes, social capital, and political participation: the United States and Mexico compared. *Mex. Stud.* 19, 29–63.
- Klesner, J.L., 2007. Social capital and political participation in Latin America: Evidence from Argentina, Chile, Mexico, and Peru. *Latin Am. Res. Rev.* 42, 1–32.
- LGEEPA, 1996. *Ley General del Equilibrio Ecológico y la Protección al Ambiente*. Dirección General de Servicios de Documentación, Información y Análisis, México
- LGPAS, 2007. *Ley General de Pesca y Acuicultura Sustentables*. Dirección General de Servicios de Documentación, Información y Análisis, México
- Ley Orgánica de la Administración Pública Federal, 1994. Decreto que reforma, adiciona y deroga diversas disposiciones de la Ley Orgánica de la Administración Pública Federal. *Diario Oficial* December 28, 2–11.
- Leslie, H., Basurto, X., Nenadovic, M., Sievanen, L., Aburto-Oropeza, O., Cavanaugh, K. C., Cota-Nieto, J.J., Erisman, B., Finkbeiner, E., Hinojosa-Arango, G., Moreno-Baez, M., Nagavarapu, S., Reddy, S.M.W., Sanchez-Rodriguez, A., Siegel, K., Ulbarria-Valenzuela, J.J., Weaver, A.H., 2015. Operationalizing the social-ecological systems framework to assess sustainability. *Proc. Natl. Acad. Sci.*
- Lin, N., Erickson, B.H., 2008. Theory, measurement, and the research enterprise on social capital. In: Lin, N., Erickson, B.H. (Eds.), *Social Capital: an International Research Program*. Oxford University Press, New York.
- Lin, N., Cook, K.S., Burt, R.S., 2001. *Social Capital: Theory and Research*. Transaction Publishers.
- Lin, N., 2001. *Social Capital: A Theory of Social Structure and Action*. Cambridge University Press, Cambridge.
- Long, J.S., 1997. *Regression Models for Categorical and Limited Dependent Variables*. Sage, Thousand Oaks, CA.
- Lopes, P.F.M., Rosa, E.M., Salyvonych, S., Nora, V., Begossi, A., 2013. Suggestions for fixing top-down coastal fisheries management through participatory approaches. *Mar. Policy* 40, 100–110.
- Lubell, M., 2004. Collaborative watershed management: a view from the grassroots. *Policy Stud. J.* 32, 341–361.
- Marín, A., Gelcich, S., Castilla, J.C., Berkes, F., 2012. Exploring social capital in Chile's coastal benthic comanagement system using a network approach. *Ecol. Soc.* 17, 13.
- Mendoza-Botelho, M., 2013. Social capital and institutional trust: evidence from Bolivia's popular participation decentralisation reforms. *J. Dev. Stud.* 49, 1219–1237.
- Menzel, S., Buchecker, M., Schulz, T., 2013. Forming social capital—Does participatory planning foster trust in institutions? *J. Environ. Manage.* 131, 351–362.
- Morris, S.D., Klesner, J.L., 2010. Corruption and trust: theoretical considerations and evidence from Mexico. *Comp. Political Stud.* 43, 1258–1285.
- Nakamura, A., Nakamura, M., 1998. Model specification and endogeneity. *J. Econom.* 83, 213–237.
- Nenadovic, M., 2015. *Participation for Conservation: the Role of Social Capital in Multi-Level Governance of Small-Scale Fisheries*. Duke University.
- OECD, 2006. *Agricultural and Fisheries Policies in Mexico: Recent Achievements, Continuing the Reform Agenda*. Organisation for Economic Co-operation and Development, Paris, France.
- Ohno, T., Tanaka, T., Sakagami, M., 2010. Does social capital encourage participatory watershed management? An analysis using survey data from the Yodo River Watershed. *Soc. Nat. Resour.* 23, 303–321.
- Ostrom, E., 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press, New York.
- Ostrom, E., 2005. *Understanding Institutional Diversity*. Princeton University Press, New Jersey.
- Pinkerton, E., 2003. Towards specificity in complexity: understanding co-management from a social-science perspective. In: Wilson, D.C., Nielsen, J.R., Degnbol, P. (Eds.), *The Fisheries Co-management Experience: Accomplishments, Challenges, and Prospects*. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 61–77.
- Pollnac, R.B., Crawford, B.R., Gorospe, M.L.G., 2001. Discovering factors that influence the success of community-based marine protected areas in the Visayas, Philippines. *Ocean Coast. Manag.* 44, 683–710.
- Pomeroy, R.S., Berkes, F., 1997. Two to tango: the role of government in fisheries co-management. *Mar. Policy* 21, 465–480.
- Pretty, J., Smith, D., 2004. Social capital in biodiversity conservation and management. *Conserv. Biol.* 18, 631–638.
- Pretty, J., 2003. Social capital and the collective management of resources. *Science* 302, 1912–1914.
- Putnam, R.D., Leonardi, R., Nanetti, R., 1994. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press.
- Putnam, R.D., 2000. *Bowling Alone: The Collapse and Revival of American Community*. Simon and Schuster, New York, NY.
- Rife, A.N., Erisman, B., Sanchez, A., Aburto-Oropeza, O., 2013. When good intentions are not enough. Insights on networks of paper park marine protected areas. *Conserv. Lett.* 6, 200–212.
- Rothstein, B., Stolle, D., 2002. How political institutions create and destroy social capital: an institutional theory of generalized trust. 98th Meeting of the American Political Science Association, Boston, MA, pp. 1–39.
- Saenz-Arroyo, A., Roberts, C.M., Torre, J., Carinno-Olivera, M., Enriquez-Andrade, R. R., 2005. Rapidly shifting environmental baselines among fishers of the Gulf of California. *Proc. R. Soc. B* 272, 1957–1962.
- Sala, E., Aburto-Oropeza, O., Reza, M., Paredes, G., Lopez-Lemus, L.G., 2004. Fishing down coastal food webs in the Gulf of California. *Fisheries* 29, 19–25.
- Sekhar, N.U., 2007. Social capital and fisheries management: the case of Chilika Lake in India. *Environ. Manage.* 39, 497–505.
- Singleton, S., 2000. Co-operation or capture? The paradox of co-management and community participation in natural resource management and environmental policymaking. *Environ. Politics* 9, 1–21.
- Sommano Ventura, M.F., 2005. Más allá del voto: modos de participación política no electoral en México. *Foro Internacional* 45, 65–88.
- Theiss-Morse, E., Hibbing, J.R., 2005. Citizenship and civic engagement. *Ann. Rev. Political Sci.* 8, 227–249.
- Uphoff, N., Wijayarathna, C., 2000. Demonstrated benefits from social capital: the productivity of farmer organizations in Gal Oya, Sri Lanka. *World Dev.* 28, 1875–1890.
- Uphoff, N., 2000. Understanding social capital: learning from the analysis and experience of participation. In: Dasgupta, P., Serageldin, I. (Eds.), *Social Capital: A Multifaceted Perspective*. The World Bank, Washington DC, pp. 215–249.
- Whitehead, L., 1994. Prospects for a 'transition' from authoritarian rule in Mexico. In: Cook, M.L., Middlebrook, K.J., Molinar Horcasitas, J. (Eds.), *The Politics of Economic Restructuring: State-Society Relations and Regime Change in Mexico*. Center for U.S. Mexican Studies, San Diego, CA, pp. 327–346.
- Wilson, J., 2006. Matching social and ecological systems in complex ocean fisheries. *Ecol. Soc.* 11, 1–22.
- Wilson, J., 2007. Scale and the costs of fishery conservation. *Int. J. Commons* 1, 141–153.
- Yandle, T., Hajj, N., Raciborski, R., 2011. The Goldilocks solution: exploring the relationship between trust and participation in resource management within the New Zealand commercial rock lobster fishery. *Policy Stud. J.* 39, 631–658.
- Yandle, T., 2003. The challenge of building successful stakeholder organizations: new Zealand's experience in developing a fisheries co-management regime. *Mar. Policy* 27, 179–192.