



Information dissemination-diffusion and marine protected area approval in the Philippines



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ARTICLE INFO

Article history:

Received 25 April 2014
Received in revised form
15 May 2015
Accepted 23 May 2015
Available online xxx

Keywords:

Information dissemination/diffusion
Marine protected areas
Coastal policy communication
Knowledge integration

ABSTRACT

This article examined fishers' support for marine protected areas (MPAs) resulting from information dissemination (i.e., government-to-citizen communication) and diffusion (i.e., citizen-to-citizen communication) processes on coastal policy. We surveyed fishers ($N = 505$) in three municipalities (i.e., Oslob, Santander, Samboan) in Southern Cebu, Philippines. Two independent variables were examined. The first was municipality, where different local governance arrangements influence coastal policy communication. Second, a K-means cluster analysis identified segments of fishers based on whether and how they were informed about coastal policies in their municipality. The dependent variables were: (a) the perceived effect of the MPAs on fishers' livelihoods, (b) approval of specific MPA policies, and (c) general approval of the MPAs. Two-way ANOVAs resulted in significant interaction effects between the independent variables and highlighted the combined influence of local governance and information dissemination/diffusion on fishers' approval of MPAs. Fishers informed through information dissemination reported a significantly higher approval of their MPA(s) than did fishers informed through information diffusion or those who were not exposed to government-initiated communication. The influence of information dissemination on MPA approval may justify the time and resources required to engage fishers through direct communication. The cluster analysis helped reveal citizen-to-citizen dynamics that impact the effectiveness of coastal policy communications.

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1. Introduction

With the declining health of coral reefs and fisheries, coastal communities face many food security and livelihoods concerns (Green et al., 2003). Population growth, overfishing, shoreline erosion, and biodiversity loss have all contributed to the depletion of ecosystem services the coral reefs might otherwise provide and have made coastal communities vulnerable (Nicholls et al., 2007; Pedcris and Fujii, 2012; USIOTWSP, 2007). Marine protected areas (MPAs) coupled with education/outreach programs attempt to address these concerns.

Approximately 6000 MPAs have been established globally (Toropova et al., 2010), but assessing their “success” has proven challenging given ecological and social influence on coastal management. Measures of both ecosystem health and human dimensions issues (e.g., stakeholder knowledge, information dissemination/diffusion, environmental education) should be

considered when evaluating MPA success (Ban et al., 2011; Blythe and Dadi, 2012; Charles and Wilson, 2009; Hamilton, 2012; Mascia, 2003; Pietri et al., 2009; Pomeroy et al., 2007).

Effective MPA implementation often depends on the identification and use of communication processes that promote knowledge-sharing and increased awareness among stakeholders (Contandriopoulos et al., 2010; Wever et al., 2012). Coastal management studies have described communication mechanisms contributing to effective MPA implementation. Some of these include interactive governance (Solstrand, 2013), “adaptive-participative” processes supporting MPA sustainability indicators (Marques et al., 2013, p. 43), working groups with community members (Fox et al., 2013), and information transfer through non-formal education (e.g., community radio or citizen science programs; Khan et al., 2012).

While studies have considered the effects of communication on MPA approval (Cardona and Morales-Nin, 2013), few have analyzed resource users who have been excluded from formal coastal management or communication processes. Soomai et al. (2013) suggest that multiple mechanisms are required for effectively

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communicating with individuals who do not participate in decision-making processes or do not take an active stakeholder role (i.e., the “general” vs. the “interested” public; p. 177). These techniques may include both direct (e.g., government-to-citizen) and indirect (e.g., citizen-to-citizen) forms of communication.

Education and outreach programs have become increasingly incorporated into evaluations of MPA and coastal governance success (Hastings, 2011; Leisher et al., 2012). Leisher et al. (2012) illustrate how a long-term environmental education program significantly improved knowledge and attitudes about MPAs for resource users. These programs emphasize knowledge integration to guide interactions and decision-making among policy makers, researchers, managers, and citizens (House and Phillips, 2013; Portman et al., 2012).

In the Philippines, the site of this study, knowledge integration through direct/formal government-to-citizen communication efforts is relevant for MPA success as fishers are exposed to coastal policies via environmental education programs. These programs and formal communication processes constitute a form of *information dissemination*, or “the controlled and managed spread of information” (Pietri et al., 2009, p. 333). On the other hand, indirect/informal citizen-to-citizen communication processes (e.g., fisher-to-fisher) represent *information diffusion* or “the spontaneous or unplanned spread of information or ideas” (Pietri et al., 2009, p. 332). This article examined the influence of information dissemination/diffusion and the municipal local governance context on MPA approval among fishers in Southern Cebu, Philippines.

1.1. Coastal management in the Philippines

Information dissemination and diffusion may increase fisher support for coastal policies in the Philippines. Situated in the world’s most marine diverse area, the Philippines has approximately 27,000 square kilometers of coral reef that generates around 1.35 billion USD in ecosystem services annually, an amount that could increase if coastal management were more effective (Carpenter and Springer, 2005; White and Cruz-Trinidad, 1998; White et al., 2002).

The 1977 Philippine Environment Code alluded to the importance of government-to-citizen communication and information dissemination related to coastal management efforts (Philippine Environment Code, 1977). This code required governments to develop public information activities to encourage awareness of and involvement in environmental protection. The Fisheries Act of 1998 sought to address unsustainable fisheries and livelihoods concerns through community-based management efforts. This Act requires municipal governments to conduct information, education, and communication (IEC) campaigns to inform citizens of coastal management practices and policies (Republic Act No. 8550, 1998).

These IECs require collaboration and knowledge integration among diverse stakeholders, especially local government units (LGUs), national government institutions (e.g., Department of Agriculture), local resource users, and non-governmental organizations (NGOs). In the Philippines, IECs may involve public meetings, open forums, and workshops often coordinated by the local Municipal Agricultural Officer.

Policies requiring IECs are vital for establishing effective MPAs in the Philippines, but ongoing stakeholder/institutional conflicts, lack of awareness, and accountability call for additional innovations in coastal management (Allegretti, 2012; Fernandez and Do, 2010; Murshed-e-Jahan et al., 2014). Formal and informal community-based education efforts may influence MPA success by improving levels of compliance and enforcement (Pietri et al., 2009). Science-

based knowledge integration and co-management arrangements are also emphasized as vital elements of effective approaches to coastal management (Arceo et al., 2013; Blythe and Dadi, 2012; House and Phillips, 2013). The impact of such approaches may be further enhanced by providing opportunities for stakeholders and policy makers to meet informally to share knowledge and experiences (Allegretti, 2012).

Education and outreach programs, perceptions of MPAs on fish catch, and local participation all contribute to MPA success (Hamilton, 2012; Leisher et al., 2012; Leleu et al., 2012; Wever et al., 2012). With between 2.7% and 3.4% of Filipino reefs currently protected within no-take MPAs (Weeks et al., 2009) – short of the goal of 10% by 2020 required by Philippine Fisheries laws – the significance of local support for coastal management efforts will not soon diminish. As municipal governments attempt to engage fishers via IECs, analyses of the potential interaction between local governance arrangements and information dissemination/diffusion become increasingly salient. Such analyses facilitate allocation of time and resources necessary for addressing coastal management goals while seeking to increase fishers’ support for MPAs.

Coastal management studies (e.g., Portman et al., 2012) emphasize information dissemination/diffusion and knowledge integration within and across sectors (e.g., science-policy, government–government, government–citizen). Attention has focused on stakeholders who have participated in coastal policy communication. Perceptions of fishers who have not attended government-initiated education/outreach programs, however, are equally important if coastal policy communication processes are to be effective. Policy effectiveness should also be examined relative to *how* fishers are informed (government-to-fisher or fisher-to-fisher, or both). This article examined: (a) were fishers informed about coastal policies, and (b), if yes, how were they informed.

1.2. Study site

This article focused on the municipalities of Oslob, Santander, and Samboan in Southern Cebu Province, Philippines (Fig. 1). These municipalities are members of the Southeastern Cebu Coastal Resource Management Council (SCCRMC), an institutional network of seven municipalities that directs the collaborative management of MPAs and municipal waters. Santander and Samboan have one MPA in their municipal waters, while Oslob has several (Allegretti, 2012; Pietri et al., 2009) (Fig. 2).

Each municipality enforces the same set of policies under Philippine Fisheries Law, yet there are differences in institutional arrangements for enforcing these coastal policies. For example, Samboan’s municipal waters overlap with the National Integrated Protected Area System (NIPAS) seascape managed by national government agencies (e.g., the Department of Environment and Natural Resources, DENR). This overlap involves national and local governance arrangements for enforcing municipal ordinances and national law protecting NIPAS seascapes. Conflict has resulted when governance styles and jurisdictions overlap between local and national government institutions (Allegretti et al., 2012). The unique enforcement of MPAs and coastal policies by certain municipal governments has the potential to influence citizen approval of and attitudes toward MPAs and toward overall coastal management initiatives.

Given these coastal management trends and policies in the Philippines, the following research questions were examined:

1. Does approval of MPAs increase as fishers are informed about coastal management (i.e., informed vs. not informed)?

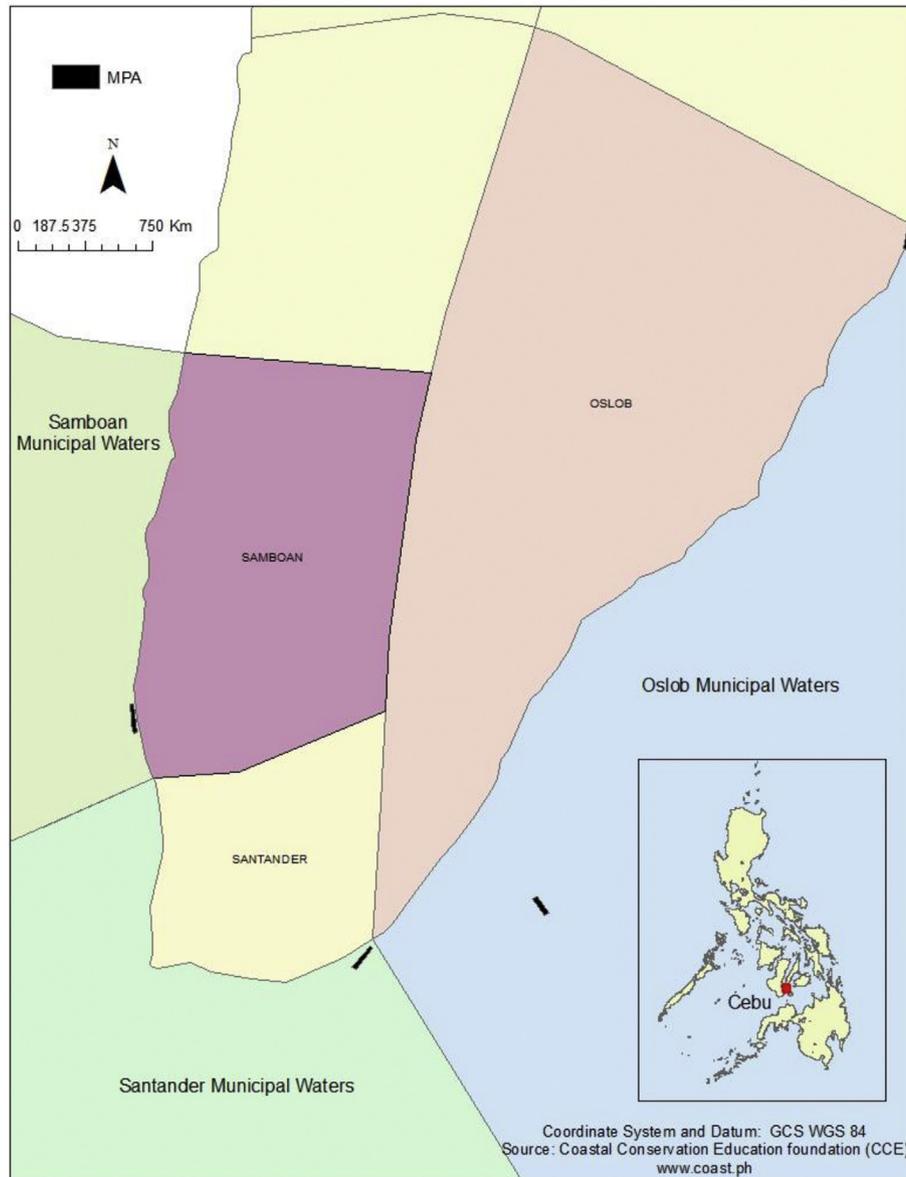


Fig. 1. Research sites in southern Cebu Province, Philippines (Allegretti et al., 2012).

2. Does approval of MPAs vary by source of information (government-to-citizen [information dissemination] vs. citizen-to-citizen [information diffusion])?
3. Does approval for MPAs vary by municipality (i.e., Oslob, Santander, Samboan)?
4. Is there a significant interaction between municipality and how fishers are informed about coastal management?

2. Methods

Face-to-face interviews were conducted with fishers in Oslob ($n = 279$), Santander ($n = 139$), and Samboan ($n = 87$) from June to August, 2009. There were a total of 505 respondents (response rate = 95%). The surveys were originally written in English and then translated into the local dialect of *Cebuano*. The surveys were pre-tested with locals, revised in *Cebuano*, and back-translated to English to ensure translation accuracy. Survey visuals were used to facilitate respondent understanding of the questions (Finchum, 2002). This included the use of thumbs up and thumbs down

signs to indicate acceptability or agreement of an MPA and a given coastal policy. The visuals were associated with a 5-point scale of very acceptable, acceptable, unsure, unacceptable, and very unacceptable.

While surveys were conducted in 2009, the coastal policy issues are currently relevant for these municipalities as indicated by our informal interviews with local government representatives of Southern Cebu, fish wardens, educators, and fishers in 2012 and 2013 (Knight and Allegretti, 2013).

2.1. Variables

Two independent variables were examined. The first was the respondents' municipality (i.e., Oslob, Santander, Samboan). These municipalities are characterized by differing fisher perceptions of coastal management that may influence the effectiveness of education and outreach efforts related to coastal policy communication (Allegretti, 2012). A previous examination of fisher perceptions suggested that conflict between fishers and policy makers is

highest in Samboan and that there was more acceptance of coastal policies in Santander and Oslob (Allegretti et al., 2012).

The second independent variable was based on *whether* and *how* respondents were informed about coastal management in their municipality. A K-means cluster analysis of five survey items was used to identify clusters or subgroups of respondents. Two of these items asked fishers to describe how informed they were about the purpose of their municipality's MPA(s) and coastal management policies. These variables were coded from -2 (extremely uninformed) to 2 (extremely informed). A third question asked if they had attended any coastal management meetings in their municipality and was coded 0 (did not attend) or 1 (did attend). The final two items asked fishers if their municipal government offered any education programs regarding the purpose of their municipality's MPA(s) and coastal policies. Each item was coded as 0 (no government-led programs offered) or 1 (government-led programs are offered). The actual wording of these questions is shown in Table 1. Because the variables were coded on different scales, the

items were converted into z-scores before analysis.

There were three dependent variables, each of which was an index comprised of multiple survey questions. Specific wording of these questions are shown in Table 2. The first index (4 items) represented the perceived effect of the MPAs on fishers' livelihoods. These items focused on perceived relationships between MPAs, fish populations, fish catch, and livelihoods and were coded on 5-point scales ranging from -2 (very harmful or strongly disagree) to 2 (very beneficial or strongly agree) with a mid-point of 0 (no opinion).

The second index (9 items) represented fisher approval of specific MPA policies (e.g., prohibition of motorized vehicles in MPAs); variables were coded on 5-point scales ranging from -2 (strongly disagree) to 2 (strongly agree) with 0 as no opinion. The third index (3 items) represented general MPA approval; items were coded on 5-point scales ranging from -2 (strongly dissatisfied or strongly disapprove) to 2 (strongly satisfied or strongly approve) with a mid-point of 0 (no opinion).

Table 1
Segmenting fishers based on information dissemination and diffusion.^a

| Survey item | Cluster group means (z-scores) | | |
|--|--|--|--------------------------|
| | 1 | 2 | 3 |
| | Informed by government-to-citizen communication (dissemination) (n = 260) | Informed by citizen-to-citizen communication (diffusion) (n = 93) | Not informed (n = 95) |
| How well informed are you on the purpose of your MPA? | .35 | .34 | -1.34 |
| How well informed are you on the purpose of the rules for your municipal waters? | .39 | .31 | -1.44 |
| Have you attended any meetings focused on managing your municipality's coastal waters? | .29 | -.42 | -.33 |
| Has the municipality set-up any educational programs that focus on the purpose of your MPA? | .74 | -1.03 | -.98 |
| Has the municipality set-up any educational programs that focus on the purpose of regulating your municipality's coastal waters? | .73 | -1.08 | -.98 |

^a The 3-group solution provided the best fit for the data.

Table 2
Descriptives and reliability analysis results for dependent variables.

| Survey item | Mean (M) | Std. Dev. (SD) | Item-total correlation | Alpha if deleted | Cronbach's alpha (α) |
|---|----------|----------------|------------------------|------------------|-------------------------------|
| MPA effect on livelihoods ^a | | | | | .89 |
| Fish populations have increased since the establishment of our MPA. | .30 | 1.15 | .79 | .84 | |
| My fish catch has increased since the establishment of the MPA. | .10 | 1.17 | .84 | .82 | |
| The sanctuary is the main reason why my fish catch has increased. | .04 | 1.19 | .81 | .83 | |
| Please rate how beneficial or harmful the MPA is to your livelihood. | .45 | 1.21 | .59 | .92 | |
| Approval of specific MPA policies ^b | | | | | .96 |
| Rate your approval of the following: | | | | | |
| Prohibition of taking corals | 1.07 | 1.20 | .84 | .95 | |
| Prohibition of taking rocks | .99 | 1.26 | .86 | .95 | |
| Prohibition of taking sand | .97 | 1.26 | .85 | .95 | |
| Prohibition of all types of fishing | .80 | 1.35 | .83 | .95 | |
| Prohibition of gleaning for sea life (sea urchins, sea weed, mollusks) | .76 | 1.34 | .83 | .95 | |
| Prohibition of building any foreshore structure including sea walls & jetties | .74 | 1.32 | .83 | .96 | |
| Prohibition of paddle boats during low tide | .64 | 1.35 | .81 | .96 | |
| Prohibition of anchoring within MPA | .83 | 1.34 | .87 | .95 | |
| Prohibition of motorized vessels | .69 | 1.38 | .77 | .96 | |
| General MPA approval ^c | | | | | .79 |
| Do you approve the location of your MPA within your municipal waters? | .61 | 1.31 | .73 | .59 | |
| To what extent do you approve of the MPA within your community? | .58 | 1.25 | .75 | .57 | |
| Please rate your overall satisfaction with the MPA regulations occurring within your community. | .06 | 1.08 | .44 | .89 | |

^a Survey items were coded on 5-point scales ranging from '-2' = "very harmful" or "strongly disagree" to '2' = "very beneficial" or "strongly agree"; in all cases, '0' = "no opinion".

^b Survey items were coded on a 5-point scale where '-2' = "strongly disagree", '-1' = "disagree", '0' = "no opinion", '1' = "agree", and '2' = "strongly agree".

^c Survey items were coded on 5-point scales ranging from '-2' = "strongly dissatisfied" or "strongly disapprove" to '2' = "strongly satisfied" or "strongly approve"; in all cases, '0' = "no opinion".

2.2. Analysis

Reliability analyses were conducted for the items comprising the three dependent variable indices. Three two-way ANOVAs were run to determine the effects of the municipality and the cluster variable (i.e., informed by government-to-citizen communication, informed by citizen-to-citizen communication, not informed) on each of the three indices. Tahmanes post hoc comparisons were used to detect differences in mean scores. A relationship was considered statistically significant at $p < .05$. Eta (η) was used to indicate the strength of a relationship. An eta (or effect size) of .10 was considered a “minimal” relationship, .243 represented a “typical” relationship, and an $\eta > .371$ reflected a “substantial” relationship (Vaske, 2008).

3. Results

Separate cluster analyses were performed for two, three, four, and five group solutions. The three-group solution provided the best fit for the data. To validate this solution, data were randomly sorted and a cluster analysis was conducted after each of three random sorts. All of these cluster analyses supported the initial three-group solution (Table 1). The first cluster ($n = 260$) consisted of fishers that were ‘informed through government-to-citizen communication’, suggesting fishers’ exposure to Information Education Campaigns. Mean z-scores suggested that these fishers’ felt informed about the purpose (.35) and rules (.39) of the MPA, had attended meetings about their MPAs (.29), and had government-initiated educational programs offered in their municipality (.73 and .74). The second cluster ($n = 93$) consisted of fishers that were ‘informed through citizen-to-citizen communication’. These fishers felt informed (.31 and .34), but had not attended meetings (–.42), and had no government-initiated educational programs offered in their municipality (–1.03 and –1.08). The third cluster ($n = 95$) consisted of fishers that were ‘not informed’. Mean z-scores suggested that these fishers did not believe that they were informed (–1.34 < z < –1.44), had not attended meetings (–.33), and had no government-initiated educational programs offered in their municipality (–.98).

Mean scores for the four survey items measuring fisher perceptions of general MPAs effect on fish populations, fish catch, and livelihoods were all positive (.04 < M < .45, Table 2). Reliability analyses suggested that these survey items could be combined into an index (Cronbach’s $\alpha = .89$) reflecting perceived MPA effects on fishers’ livelihoods. Fishers generally thought that their MPAs were somewhat beneficial to their livelihoods ($M = .45$) and were unsure whether MPAs were the reason for fish catch increase within municipal waters ($M = .04$).

Mean scores for the nine survey items measuring fisher approval of specific MPA policies were all positive (.64 < M < 1.07). Fishers reported the highest approval of the specific policy

prohibiting the taking of corals from their MPA(s) ($M = 1.07$). They generally approved of the policy prohibiting the use of paddle boats during low tide ($M = .64$). The Cronbach’s alpha for these variables was .96.

The mean scores for the three items measuring fisher approval of the location of their MPA(s), approval of the MPA(s) in general, and satisfaction with the MPA(s) in their municipality were all positive (.06 < M < .61). Fishers were ambivalent regarding their overall satisfaction with MPA regulations ($M = .06$), and they generally approved of the location of their MPA(s) ($M = .61$). The Cronbach’s alpha for this general MPA approval index was .79.

Factorial ANOVAs examined differences among the information clusters (3 levels) and municipalities (3 levels) for each of the three dependent indices (Table 3). Results for the ‘MPA effects on livelihood’ index revealed significant main effects for the source of information cluster ($F(2, 432) = 34.90, p < .001, \eta = .37$) and municipality ($F(2, 432) = 4.51, p = .012, \eta = .14$), and a significant interaction effect was also observed ($F(4, 432) = 3.58, p = .007, \eta = .17$). Fishers from Santander who were informed by government-to-citizen communication perceived MPA effects on their livelihood most positively ($M = .61$). Uninformed fishers from Samboan held the most negative views ($M = -1.12$). Fishers informed by citizen-to-citizen communication viewed MPAs as only slightly beneficial for their livelihoods; those from Oslob reported the highest scores ($M = .13$).

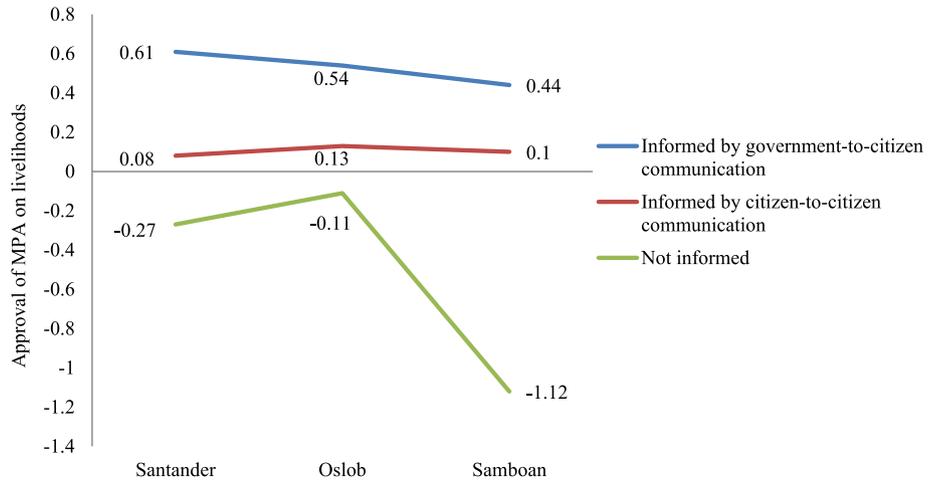
The second ANOVA assessed the effects of the information cluster and municipality variables on the ‘approval of specific MPA policies’ index. Main effects were observed for cluster membership ($F(2, 424) = 48.19, p < .001, \eta = .44$) and municipality ($F(2, 424) = 11.93, p < .001, \eta = .22$), and a significant interaction effect was also observed ($F(4, 424) = 8.85, p < .001, \eta = .28$). Fishers from Santander who were informed by government-to-citizen communication approved of specific MPA policies more than any other fisher group ($M = 1.47$). Uninformed fishers from Samboan were the only fishers who disapproved of specific MPA policies in their municipality ($M = -1.05$). Fishers informed by citizen-to-citizen communication approved of specific MPA policies in each municipality; those from Santander reported the highest scores ($M = 1.07$) (Fig. 3).

The third ANOVA assessed the effects of the cluster membership and municipality variables on the ‘general MPA approval’ index. Significant main effects were observed for information cluster ($F(2, 439) = 45.95, p < .001, \eta = .41$) and municipality ($F(2, 439) = 6.32, p < .002, \eta = .17$) variables, and a significant interaction effect was also observed ($F(4, 439) = 6.13, p < .001, \eta = .22$). Fishers from Santander who were informed by government-to-citizen communication reported a higher general MPA approval than did fishers in any other group ($M = .90$). Uninformed fishers from Samboan again held the most negative views of their MPA ($M = -1.15$). Fishers informed by citizen-to-citizen communication reported slight approval of MPAs in each municipality, with those from Santander reporting the highest scores ($M = .67$) (Fig. 4).

Table 3
Cluster x Municipality factorial ANOVAs^a for the dependent variables.

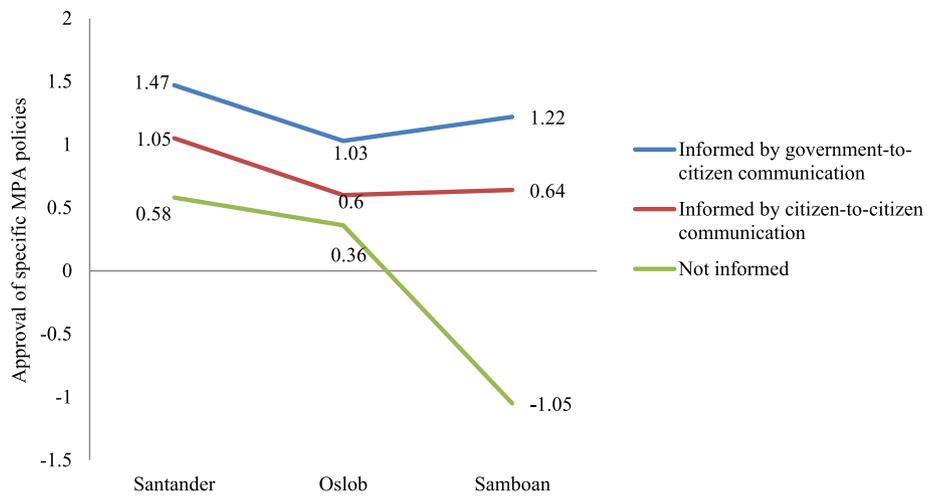
| Index | A (Cluster) | | | B (Municipality) | | | AxB (Interaction) | | |
|-------------------------------------|-------------|-------|--------|------------------|-------|--------|-------------------|-------|--------|
| | F | p | η | F | p | η | F | p | η |
| Perceived MPA effects on livelihood | 34.90 | <.001 | .37 | 4.51 | .012 | .14 | 3.58 | .007 | .17 |
| Approval of specific MPA policies | 48.19 | <.001 | .44 | 11.93 | <.001 | .22 | 8.85 | <.001 | .28 |
| General MPA approval | 45.95 | <.001 | .41 | 6.32 | .002 | .17 | 6.13 | <.001 | .22 |

^a η values measure effect size, where .1 = minimal, .241 = typical, and >.371 = substantial.



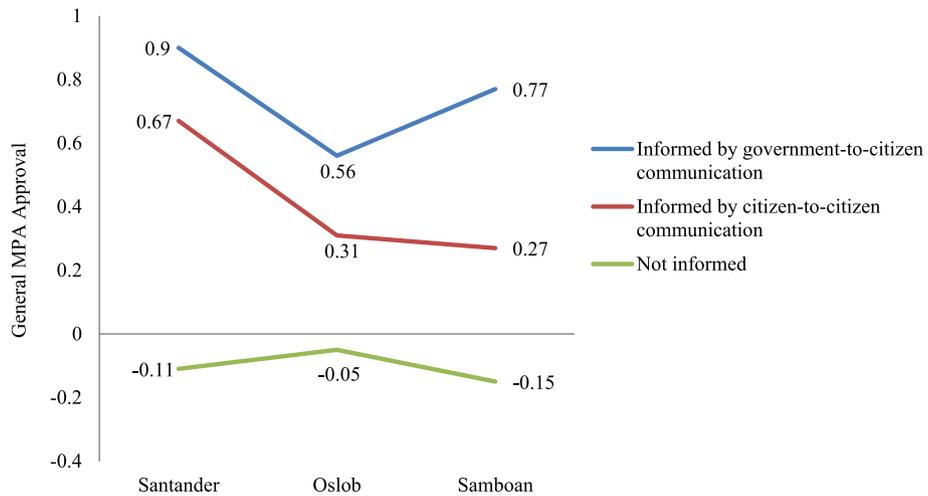
1. Numbers in figure are means

Fig. 2. Approval of MPA on livelihoods by municipality and cluster group¹.



1. Numbers in figure are means

Fig. 3. Specific approval of MPA policies by municipality and cluster group¹.



1. Numbers in figure are means

Fig. 4. General MPA approval by municipality and cluster group¹.

4. Discussion

This article explored the influence of information dissemination/diffusion and the municipal local governance context on MPA approval among fishers in Southern Cebu, Philippines. Cluster analysis suggested that, among the fishers from Oslob, Santander, and Samboan, three subgroups existed that varied according to *whether* and *how* they were informed about coastal management. Those who attended meetings on coastal management and who reported having government-initiated educational programs offered in their municipality were categorized as being informed through government-to-citizen communication. Such communication could be considered a form of information dissemination. Those who considered themselves informed about their MPA, but had not attended meetings on coastal management and had reported having no government-initiated educational programs in their municipality were categorized as being informed through citizen-to-citizen communication. Such communication could be considered a form of information diffusion. Fishers in the third cluster considered themselves not informed.

Labeling fishers as ‘informed through government-to-citizen communication’ (i.e., information dissemination) does not preclude the possibility that these fishers may also have been informed through citizen-to-citizen communication (i.e., through information diffusion). Conversely, fishers ‘informed through citizen-to-citizen communication’ may have had some exposure to purposeful, government-initiated communication efforts. Our findings simply suggest that fishers in the first cluster were exposed to government-initiated communication on coastal policy *more than* fishers in the other two clusters.

The three fisher clusters represented a communication/awareness continuum whereby fishers in the first cluster experience the greatest degree of information dissemination – followed by the second cluster and the third – on the purpose of MPAs and coastal policies. The cluster analysis represents a useful tool for segregating fishers and analyzing the effects of information dissemination and diffusion on MPA and coastal policy awareness and approval.

Fishers were asked whether or not their municipality had set up educational programming on the purpose of their MPA(s) and on the purpose of regulating coastal waters. These items measured the extent to which fishers were *aware* of programming being offered. A municipality may have established educational programs that the fishers knew nothing about. In this case, the municipality’s efforts to communicate with fishers were not effective, alluding to barriers hindering information dissemination and coastal policy communication. These survey items represent one approach for measuring municipalities’ effectiveness at communicating about coastal management.

The ANOVAs and post hoc comparisons suggested that fisher perceptions and approval of MPAs were significantly influenced by three factors: (1) *whether* fishers were informed, (2) *how* fishers were informed (i.e., by information dissemination or diffusion), and (c) *where* fishers were from (i.e., municipality). Fishers categorized as ‘uninformed’ were significantly less supportive of coastal policies. This group perceived their MPA(s) as having no positive effect on their livelihood. The ‘uninformed’ group was also ambivalent toward specific MPA policies and reported a general disapproval of and dissatisfaction toward their MPA(s) and coastal policies. These results support research question one.

Post hoc tests suggested that fishers informed through government-to-citizen communication were more likely to approve of MPAs than the other two groups. They perceived their MPA(s) as having a beneficial effect on their livelihood, were supportive of specific MPA policies, and reported a general approval of MPAs more than did fishers who were informed through citizen-to-

citizen communication. These results support research question two.

Like fishers from Oslob and Santander, fishers from Samboan who were informed through government-to-citizen or citizen-to-citizen communication held positive views of their MPA. Uninformed fishers from Samboan, however, reported greater disapproval of their MPA than did uninformed fishers from the other municipalities. The significant interaction effect between the cluster and municipality variables suggests that government-to-citizen communication is occurring less effectively, if at all, in Samboan. Conversely, “the controlled and managed spread of information” (Pietri et al., 2009, p. 333) influenced fisher approval of MPAs most positively in Santander. Unique local governance arrangements, management, and communication styles may influence differing perceptions of MPA approval and citizen support (Allegretti et al., 2012; Murshed-e-Jahan et al., 2014). These results support research questions three and four.

Previous research in Samboan suggests minimal fisher support for coastal policies and MPAs (Allegretti et al., 2012). Unlike the cluster analyses here, previous research did not segment fishers on how and whether they were informed about coastal policies. As a result, Samboan fishers were considered primarily unsupportive of coastal policies more than fishers in neighboring municipalities such as Oslob and Santander. The cluster analyses enables coastal managers to distinguish which groups of fishers are supportive of coastal policies due to educational programs. For Samboan, this article pinpoints that it was only uninformed fishers who were unsupportive of coastal policies.

The lack of support among Samboan fishers is potentially related to the political division among local government representatives with conflicting views about coastal conservation and management. Specifically, fisher cooperatives or People’s Organizations had strong ties to a politically divided legislative council who enacted coastal policies, but also needed election votes. The complex relationships among fishers and local governments are part of the socio-political dynamics that influenced fisher support for coastal policy workshops and educational programs.

From a theoretical perspective, the typical effect sizes for the interaction between the fisher clusters and municipality reflect the influence of government-to-citizen communication on galvanizing MPA approval (Vaske, 2008). In Oslob, Santander, and Samboan, these findings suggest that the IECs required by law have a more positive impact than previously recognized. The campaigns seem to be worth the time, energy, and required finances. Future studies might analyze how fisher perceptions of MPAs are influenced by specific IEC approaches or by other forms of information dissemination. Such studies might evaluate potential differences between alternative methods of government-initiated education and communication efforts (e.g., public forums, field trips, and small/informal meetings) in galvanizing MPA approval among fishers.

This article suggests that effective dissemination of information begins long before an actual education/outreach event is held. Fishers reporting the highest MPA approval were those who stated there were government-initiated education programs offered in their municipality. While a municipality may emphasize vertical knowledge integration (between policy makers and fishers) via IECs, it should place initial importance on ensuring that all fishers are aware of the opportunities available. Future studies may utilize social network analysis to evaluate *where* information is coming from in influencing fisher awareness and MPA approval.

Local NGOs adopting social marketing campaigns, such as the RARE pride campaign, have been effective in gaining community pride for their MPAs and facilitating information dissemination on coastal policies within municipalities (McKenzie-Mohr, 2000). Encouraging dissemination of information *between* municipalities

is equally important. The value of horizontal knowledge integration (between regulatory bodies of multiple municipalities, or between fishers from different municipalities) should not be overlooked. Future studies should explore variations in such vertical and horizontal knowledge integration across municipalities.

5. Ways forward

IECs are central to this article and represent one mechanism by which municipal governments in the Philippines may effectively engage and communicate with fishers. As with many government-initiated education and outreach programs, IECs aim to increase fisher awareness or understanding of policies, science, and management approaches. Coastal management studies often seek to evaluate such gains in fisher awareness and approval. However, while fisher awareness of coastal *policies* is important, this article suggests that fisher awareness of the *programs* is equally important.

Based on previous research and the findings in this article, specific recommendations may be made to improve government-to-citizen communication. To cultivate participation and ownership of IECs at the municipal level, leadership from the Mayor, legislative council, and the Municipal Fisheries and Aquatic Council (MFARMC) is indispensable. The MFARMC is a local government institution accountable for IECs. Past research in Southern Cebu (Allegretti et al., 2012) highlighted the conflict due to unequal workloads, lack of accountability, and insufficient capacity among the members of MFARMC teams.

Managing conflict and enhancing effective communication at the municipal governance level (MFARMC) influence the way policies and IECs are implemented within each municipality. A recommendation for improving IEC implementation would be to address existing conflict among MFARMC members. This could be done by reviving externally-facilitated conflict management workshops emphasizing the relationships and interdependencies of MFARMC members and the consequences concerning coastal policy communication.

Improving collaboration at the community or *barangay* level is equally necessary for enhancing IECs. Barangay officials are key to communicating coastal policies and engaging communities in IECs and coastal policy enforcement. Tesch (2013) stressed the importance of increased collaboration between barangay officials and citizens by creating effective social marketing and IECs in Southern Cebu. Social marketing campaigns may play a major role in communicating information and gaining community support for specific policies or programs. As such, an additional recommendation would be for Oslob, Santander, and Samboan to consider creating social marketing programs to enhance the effectiveness of coastal policy communication.

Knowledge integration and collaboration among barangay, municipal, and MPA network members (SCCRMC) are necessary to represent barangay interests and issues potentially addressed by MPA network municipalities. A final recommendation for enhancing collaboration would involve barangay officials and fishers participating in and consistently attending SCCRMC monthly meetings. Municipal funds from MPA user fees could be set-aside for these stakeholders to be more involved in decision-making concerning coastal policies and IEC implementation.

6. Conclusion

We examined fishers' support for MPAs and coastal policies based on exposure to information dissemination and diffusion. Information dissemination efforts such as IECs can take myriad forms as NGOs, educators, researchers, and local government officials engage communities and resource users through

environmental education and social marketing programs. Similarly, information diffusion processes may take many forms and be challenging to identify. We assumed that if fishers considered themselves informed about coastal policies but had not attended municipal education programs, they were *primarily* informed through "the spontaneous or unplanned spread of information or ideas" (Pietri et al., 2009, p. 332).

Many factors could influence a fisher's exposure to information diffusion and dissemination. For example, conflicting interests among local government representatives and fisher cooperatives could influence fisher support for coastal policies and education campaigns. Time and motivation to attend government-led coastal education campaigns could also play a role. An analysis of the elements hindering the involvement of fishers in government-to-citizen communication efforts merits further study.

It is equally crucial to examine factors influencing the capacity and accountability of local government institutions to initiate and sustain IECs. The lack of quality IECs or sustained government-to-citizen communication efforts highlights the need of local governance capacity for openly and consistently communicating coastal policies and the science behind them (House and Phillips, 2013). Resources such as time, funding, and accountable personnel in local government institutions contribute to the challenges of initiating and sustaining quality IECs.

Accountability and conflict within local government institutions influence government-to-citizen communication efforts and may consequently hinder stakeholder acceptance of coastal policies (Allegretti, 2012). Context-specific and culturally appropriate IECs may serve as conflict management tools, providing opportunity and space for stakeholders to collectively discuss issues salient to differing social groups within the community.

Philippine IECs are a form of information dissemination aimed at integrating government, scientist, and fisher knowledge (i.e., understanding) of coastal policy and MPAs. IECs may also provide a comfortable space for sharing stakeholder perspectives crucial in coastal policy decision-making. Coastal policy decisions are made in the interest of participating stakeholders, but it is necessary to consider the interests of non-participants in the decision-making process (Lukes, 2005). Analyzing the influence of education programs on MPA support should thus incorporate the perceptions of fishers who participate in such programs as well as the perceptions of those who do not. Addressing participant and non-participant views supports a more holistic methodology for analyzing knowledge integration processes and perceptions of coastal management (Raymond et al., 2010).

This article explored fishers' support for coastal policies and MPAs on the basis of their exposure to government-initiated education and coastal policy communication efforts. Harnessing citizen support for MPAs and coastal policies will require an understanding of information diffusion and dissemination processes in local and culturally specific contexts. Such understanding may be enhanced by utilizing cluster analysis to segregate fishers into groups based on whether and how they are informed of coastal management practices. By grouping fishers in this fashion, studies may expose underlying socio-political processes that hinder the flow of information – and thus the effectiveness of coastal policy communication – within and between municipalities. Further exploration of these processes will support efforts to integrate knowledge among coastal policy makers, researchers, managers, and resource users more effectively.

Acknowledgments

We sincerely thank the Center for Collaborative Conservation (CCC) for funding our work. We are also grateful to Coastal

Conservation Education (CCE) Foundation, Nonong Burreros, whose life is a continued inspiration for many others despite his recent and untimely passing, and the Fish Wardens of Santander for sharing their stories and insights while providing access to the communities.

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