Kuroshio Science 18-1, 125-137, 2024

Symposium Proceedings

Intermediate impacts of abalone resource management project's social marketing and advocacy campaigns on knowledge, attitude and perceptions of fishers in Lahuy Group of Islands, Caramoan, Camarines Sur

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INTRODUCTION

The sedentary cryptic donkey's ear abalone, *Haliotis asinina*, is a single shell mollusk that live in tropical coralline habitat in coastal areas in the Philippines. It is a commercially important high-value seafood harvested by marginal fishers. Abalones are mostly sold immediately, either live or as blanched meat without shell, to local buyers to obtain cash for immediate purchase of basic food needs of fishing households. The local buyers aggregate the product and sell mainly to exporters and some local specialty restaurants in the Philippines. But its wild stock is at risk due to high fishing pressure (Salayo et al., 2020).

When the management of fishing effort is not enough, there are opportunities to increase fish food supply through the release of cultured organisms to enhance or restore. One of these approaches is stock enhancement and restocking which involve releases of hatchery-reared juveniles to support self-recruiting stocks in the face of intensive exploitation and/ or habitat degradation (Salayo et al., 2020).

The abalone fishery of Lahuy group of Islands, Caramoan, Camarines Sur is currently being subjected to high fishing pressure which necessitating enhancing the current stocks to percent further decline through stock enhancement and restocking of hatchery-reared juveniles to support self-recruiting stocks. However, after several abalone stock assessments conducted by PSU Team and SEAFDEC scientists who joined the field survey in 2018, it was found that the natural stocks of abalone in the area are still adequate to require restocking of hatchery-raised abalone, and are capable of self-recruitment if given adequate resource management intervention. Given this, the project shifted from abalone stock enhancement to a more practical abalone resource management strategy using abalone MFRS as a management tool to address declining stocks due to overexploitation (Salayo et al., 2020).

The Philippines had varying experiences of community-based approaches to fisheries and resource management. A key element of these community-based initiatives is education about ecological and biological processes and the impact of anthropogenic pressures on those systems. However, psychological studies have consistently shown that increasing knowledge through education does not necessarily lead to a change in actions or behavior. Social marketing - the application of commercial marketing techniques to effect positive social change have proven to be an effective method for achieving sustained behavior change across a range of subjects and audiences. Conservation organizations have begun using social marketing techniques with increasing frequency over the last decade. Although rarely, social marketing is recently used in local fisheries conservation and management.

Given its effectiveness, a social marketing approach was implemented for the abalone resource management in Hapunan Island as a social preparation intervention to promote positive behavior towards sustainable utilization of abalone fishery resource and abalone resource governance (Andriamalala, 2013).

This study uses Knowledge, and Attitude (K and A) and Theory of Reasoned Action/ Planned Behavior (TRA/TPB) (Fishbein and Aizen, 1967) in its conceptual framework. The K and A model sequence proposes that, when individuals gain more knowledge about a certain topic, their attitude becomes more favorable, resulting in positive actions. The TRA model explains the relationship between attitudes and behaviors within individuals' action. It is mainly used to predict how individuals will behave based on their pre-existing attitudes and behavioral intentions. An individual's decision to engage in a particular behavior is based on the outcomes the individual expects will come as a result of performing the behavior. Individuals develop certain beliefs or normative beliefs as to whether or not certain behaviors are acceptable.

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These beliefs shape one's perception and determine one's intention to perform or not perform the behavior (Aizen and Albarracin, 2007). The evaluation of the outcome refers to the way people perceive and evaluate the potential outcomes of a performed behavior. Such evaluations are conceived in a binary "good-bad" fashion-like manner.

The KAP survey was implemented before and after the implementation of the social marketing intervention to establish baseline levels and measure changes that result from interventions, and for advocacy. It was also implemented to identify needs, problems and barriers in program delivery, as well as solutions for improving quality of the project. KAP studies aim to establish reliable data that can be used to understand behaviors of clienteles of intervention. These data provide better information for the implementation of the project (Senachai, et al., 2022). .

In view of the significant influence of perceptions, apart from knowledge and attitude on the behavioral intention of individuals in the context of acceptance of abalone resource management, an extended Unified Theory of Acceptance and Use of Technology (UTAUT) model (Figure. 1) was developed to explain resource users' intention and adoption of positive behavior towards rational exploitation of abalone resources. UTAUT suggests three constructs acting as direct determinants of behavioral intention namely performance expectancy, effort expectancy, and trustworthiness expectancy. Performance expectancy is defined as the degree to which an individual believes that using the system (in this case participating in the abalone resource management scheme) will help him or her to attain gains in job performance (in this case, gains in abalone fishing i.e. increased catch). It is represented as perceived benefit and usefulness of the intervention. Effort expectancy is defined as the degree of ease associated with the use of the intervention (in this case, simplicity and community-rootedness of the intervention). (Zhou, 2021).

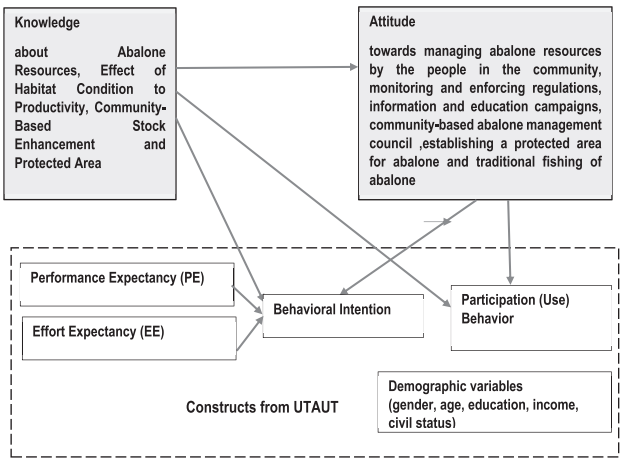

Fig. 1. An Extended UTAUT Model (modified from Zhou et al., (2021))

METHODOLOGY

This study employed a survey using a structured questionnaires probing on resource users' knowledge and attitude modified from United States Agency for International Development – Knowledge, Attitude and Practices (USAID-KAP) survey questionnaire (Walters et al., 1998), and perceptions about performance and effort expectancy modified from technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT) survey questionnaires (Moore and Benbasat, 2001).

Two surveys using the same questionnaire were conducted before and after the project which covered the two year-period of implementation. The knowledge constructs of the questionnaire focused on the resource user's extent of knowledge of abalone resources, effect of habitat condition to productivity, stock enhancement, community-based stock enhancement and protected area and habitats of abalone; while the attitude constructs focused on the attitude towards community-managed abalone stock enhancement strategy. The perceptions about performance and effort expectancy constructs covered perceived benefits of abalone protected area management, usefulness of community-based stock enhancement and ease of implementation of these fishery resource management tools as social innovation where positive perception equates with adoption or behavioral intention demonstrating cooperation to the resource use behaviors prescribed by the management tools. The responses to these constructs were rated using 5-point Likert scale where: _____, _____, _____,_____ and _____.

The resource users' KAP response was analyzed by taking the weighted mean of each item and the mean score. The frequencies of responses for the resource users KAP was multiplied by the scores on the Likert scale. The notations used for the weighted frequencies were Fsa (strongly agree), Fma (moderately agree), Fa (agree), Fmd (moderately disagree), and Fsd (strongly disagree), respectively. The following equation was employed:

$$X = \frac{[Fsa*5+Fsa*4)+(FA*3+FMD*2)+(Fsd*1]}{N}$$

where X is the weighted mean of responses of each resource user ; F is the frequency of responses for each question item ; and N is the number of observations.

The changes on KAP attributed to the project was

determined by the difference between the weighted mean of responses in the pre- and post-project KAP survey using the same questionnaire.

The impact of the project intervention on KAP was analyzed following two stage process: first, percentage change was computed for the weighted means of KAP constructs using the pre and post project survey data. Then, regression analysis of the post project survey data was conducted relating post-survey knowledge variables with attitude variables to determine whether the variations in knowledge significantly contributed to the variations in attitude of the respondents after the project:

1. Percentage Change Analysis

The percentage change analysis was employed for Unmatched Pre - Post Surveys data since the number of participants responding to the pretest and posttest were somewhat different. Using percentages in the formula provides a more precise measure of the after versus before change in value (Pope, 2008). The Percentage change (or percent change) measures the difference in value using percentages. Percent change is one means of demonstrating project impact or conveying the magnitude of a change. It shows the difference between the after (T1) versus before (T0) values. Percentage change can be positive or negative. The percentage was calculated by subtracting the before (T0) value from the after value (T1); then divide by the before (T0) value. Multiply the result by 100. Add a % sign following:

% change = (after value – before value) / before value) * 100.

Where,
% change = impact on the parameters attributable to the project intervention
After value = weighted mean of the parameter at pre-test survey
Before value = weighted mean of the parameter at post-test survey

2. Regression Analysis Using Post-Survey Data

Reporting a percentage change from baseline gives the results of a randomized trial immediately accessible. However, percentage change from baseline is statistically inefficient. The use of regression can be used in reporting percentage change to test significance (Vickers, 2001). Using post-survey data, a regression model was specified following:

$f = \text{constant} + \beta 1\, b + \beta 2\, g$

Where,
f = weighted mean of post-survey attitude variable (dependent variable)
$\beta 1$ = partial regression coefficient of knowledge variable 1 (independent variable, b)
$\beta 2$ = partial regression coefficient of knowledge variable 2 (independent variable, g)

A p value lesser than 0.05 indicates significant influence of the post-survey values on knowledge variables on attitude variables attributed to the project.

The changes measured represent the intermediate impact of the project on resource users' KAP and acceptance of abalone fishery management and conservation tools as social innovation

RESULTS

Changes in Knowledge

Knowledge of Abalone Resources, Effect of Habitat Condition to Productivity, Stock Enhancement, Community-Based Stock Enhancement and Protected Area

The changes in extent of knowledge on abalone resources, effect of habitat condition to productivity, stock enhancement, community-based stock enhancement and protected area before and after the project are presented in Table 1. All of the five knowledge statements probing on the respondents' familiarity about abalone resources, effect of habitat on their productivity, stock enhancement, community-based stock enhancement and protected area for abalone consistently posted positive differences between the two time periods. Using a 5-point Likert scale the differences ranged from 0.48 for awareness on the effect of habitat condition to productivity of abalone to 1.53 for knowledge about community-based stock enhancement of abalone in coastal area. The grand weighted mean on level of knowledge about abalone and related conservation concepts increased from 2.56 (moderately knowledgeable) to 3.44 (knowledgeable) posting net gain of 0.88, or almost a single unit increase in knowledge.

A similar pattern of positive change in knowledge can be gleaned from the consistent percentage increases in all five knowledge statements.

Figure 2 reflected that among the knowledge statements that posted positive change, the highest percentage increase was computed for knowledge about community-based stock enhancement of abalone in coastal area (96%) followed by knowledge about stock enhancement of abalone in coastal area (57%). The least computed change in knowledge is on the fisher respondents' familiarity about the abalone resource (4%). An average increase of 34% in knowledge was

computed for the fisher respondents attributable to the project.

Figure 3 very clearly revealed the relatively large improvement in knowledge about community –based stock enhancement, stock enhancement of abalone and about protected area. While a slim one can be observed for the enhancement of knowledge about abalone resource. The large improvement is attributed to the low prior knowledge of fisher respondents' base about community –based stock enhancement, stock enhancement of abalone and about protected area, while the slim enhancement of knowledge about abalone resource can be explained by the existing higher level of knowledge of the fisher respondents about abalone resource in the area even when the project was not in implementation.

Knowledge on Habitats of Abalone

The changes in extent of knowledge on habitats of abalone before and after the project are presented in Table 2.

Among the habitats, mangrove area posted the initially lowest mean rating of knowledge (mean=1.7 low knowledgeable), followed by knowledge on sandy substrate (mean=2.3 low knowledgeable). Knowledge about coral reef posted the highest initial rating (mean=2.3, low

Table 1. Changes and percentage increase in knowledge in abalone resource, effect of habitat condition to productivity, stock enhancement, community-based stock enhancement and protected area before and after the project

Knowledge Statements	T_1	T_o	T_1-T_0	% increase
Knowledge about abalone resource	3.64	3.50	0.14	4
Awareness on the effect of habitat condition to abalone productivity	3.48	3.00	0.48	16
Knowledge about stock enhancement of abalone in coastal area	3.13	2.00	1.13	57
Knowledge about community-based stock enhancement of abalone in coastal area	3.13	1.60	1.53	96
Knowledge about protected area or sanctuary for abalone in coastal area	3.81	2.70	1.11	41
Grand weighted mean	3.44	2.56	0.88	34

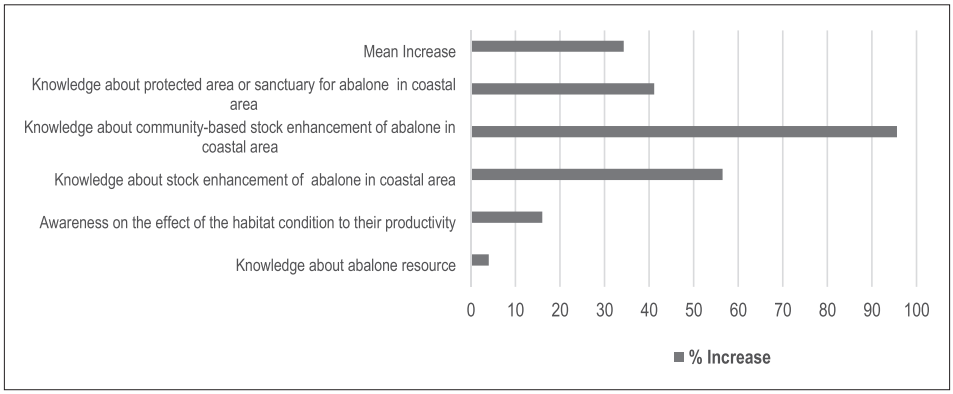

Fig. 2. Bar chart showing percentage increase in knowledge in abalone resources, effect of habitat condition to productivity, stock enhancement, community-based stock enhancement and protected area due to the project

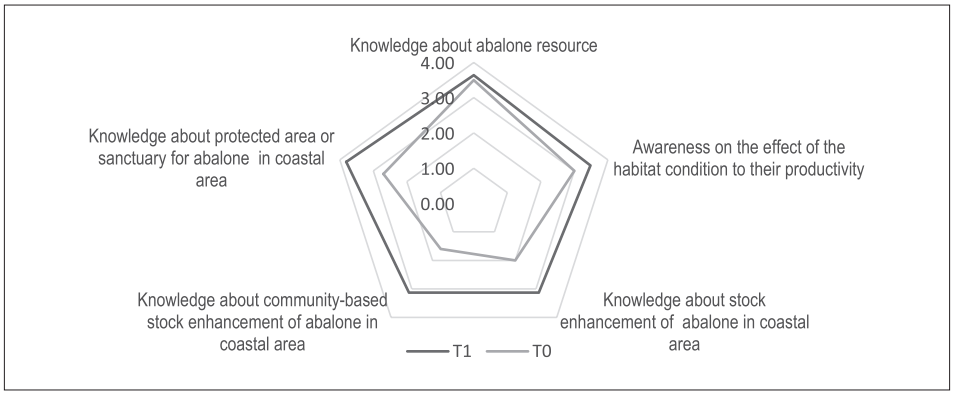

Fig. 3. Radar chart showing mean extent of knowledge in abalone resources, effect of habitat condition to productivity, stock enhancement, community-based stock enhancement and protected area before and after the project

knowledgeable). After the intervention, except for coral reef, the knowledge about seagrass bed posted the relatively highest rating (mean=3.55, Substantially knowledgeable), followed by sandy substrate (mean=3.3, Moderately knowledgeable). Knowledge about mangrove area consistently posted the relatively rating among the habitats (mean=3.03, Moderate knowledgeable). The gain in knowledge due to the project was relatively highest for mangrove which posted a 78% increase, followed by knowledge in sandy substrate with observed increase at 47%.Knowledge in seagrass bed posted a 31% increase due to the intervention. It appeared that there was not much difference in knowledge about coral reef before and after the project because the fishers' knowledge on the habitat is already high initially.

Overall, the intervention created a 20% increase in knowledge on abalone habitats.

Figure 4 very clearly revealed the relatively large improvement in knowledge about mangrove area, followed by knowledge on sandy substrate. The large improvement is attributed to the low initial knowledge of fishers on mangrove habitat and sandy substrate. The absence of knowledge gain on coral reef could be attributed to the existing higher knowledge of fishers on coral reefs due to interventions in the past by fisheries agencies such as the community-based coastal resource management, fishery sector program and similar undertakings which focused on coral-reefs as fish sanctuary-fishery reserve areas as management tool. The very narrow differences in knowledge for coral reef, and wider differences in knowledge for mangrove and sandy substrate habitats between two evaluation periods are shown in Figure 5.

Table 2. Changes and percentage increase in knowledge of habitats before and after the project

Knowledge Statements	T_1	T_0	T_1-T_0	% Increase
Knowledge about coral reef	4.34	4.4	-0.06	0
Knowledge about sandy substrate	3.38	2.3	1.08	47
Knowledge about seagrass bed	3.55	2.7	0.85	31
Knowledge about mangrove area	3.03	1.7	1.33	78
Grand weighted mean	3.58	2.78	0.80	29

Changes in Attitude

Attitude Towards Community-Based Resource Management, Monitoring and Law Enforcement, Information and Education Campaigns, Community-based Management Council, Protected

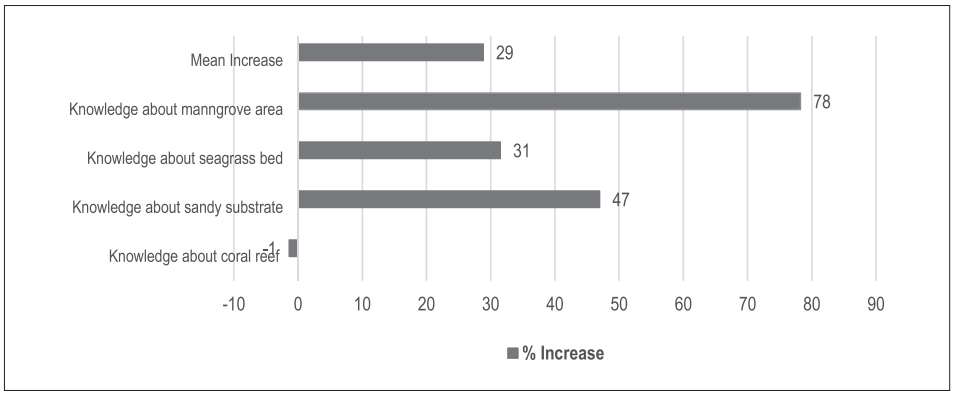

Fig. 4. Bar chart showing percentage increase in knowledge on habitat due to the project

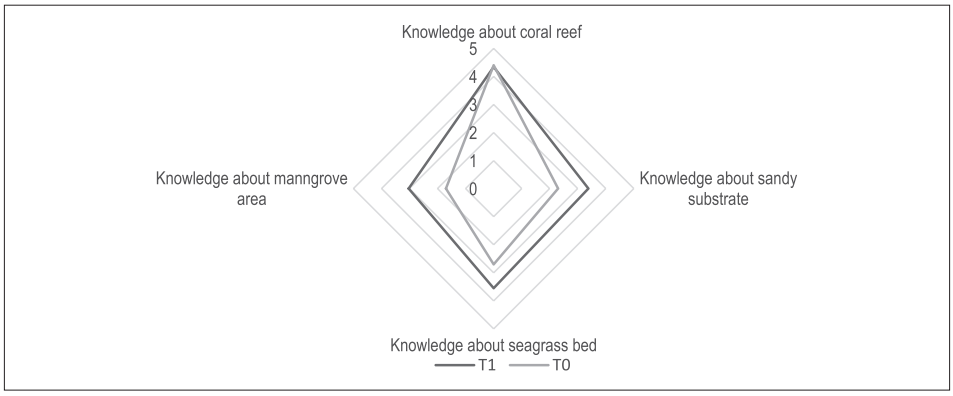

Fig. 5. Radar chart showing mean extent of knowledge in habitats before and after the project

Area Establishment and Traditional Fishing of Abalone

Initially, the attitude statements toward managing abalone resources by the people, monitoring and enforcing regulations for rational collection of abalone, a community-based abalone management council and establishment of abalone protected area have similarly posted relatively low rating (mean=3.8, Substantial support).

After the intervention, the attitude statement towards establishing abalone sanctuary-reserve posted the lowest rating (mean=3.86, Substantial support), followed by attitude statement towards monitoring and enforcement of regulations for managing abalone fishery (mean=3.97, Substantial support), and attitude towards establishment of abalone management council (mean=4.05, Substantial support). Among all, the attitude towards information and education campaigns posted the highest rating (mean=4.31, Substantial support), followed by the attitude statement towards traditional fishing of abalone (mean=4.26, Substantial support).

The change in attitude due to the project posted the highest gain for conducting information and education campaigns to enhance understanding of people about sustainable fishing of abalone (11%), followed by change in attitude towards managing abalone resources by the community (8%) and support for traditional fishing of abalone (9%).

Overall, the attitude towards community-managed abalone stock enhancement strategy posted a net gain of 7% in changes attributable to the project (Table 3).

The percent change was relatively small for all attitude statements which merely ranged from 2% (attitude towards establishing protected area for abalone) to 11% (conduct of IEC on abalone management) (Figure 6). However, it could be gleaned in Figure 7, that the project has created wider change in attitudes between the two time periods.

Changes in Perceptions

Perceived Benefits of Abalone Protected Area Management in Increasing Stock Population, Fishing Income, and Enhancing Ecological Functions

Table 3. Percentage increase in attitude toward community-based resource management, monitoring and law enforcement, information and education campaigns, community-based management council, protected area establishment and traditional fishing of abalone before and after the project

Attitude Statement	T_1	T_0	T_1-T_0	% Increase
Extent of support to managing abalone resources by the people in the community	4.09	3.8	0.3	8
Extent of support for monitoring and enforcing regulations for the rational collection of abalone	3.97	3.8	0.2	4
Extent of support for conducting information and education campaigns to enhance understanding of people about sustainable fishing of abalone in your area	4.31	3.9	0.4	11
Extent for support for a community-based abalone management council in your area	4.05	3.8	0.3	7
Extent for support for establishing a protected area or sanctuary for abalone to promote protection of parent stocks and spillover of young populations in your area	3.86	3.8	0.1	2
Extent of support for traditional fishing of abalone to promote sustainability of the resources	4.26	3.9	0.4	9
Grand weighted mean	4.09	3.83	0.26	7

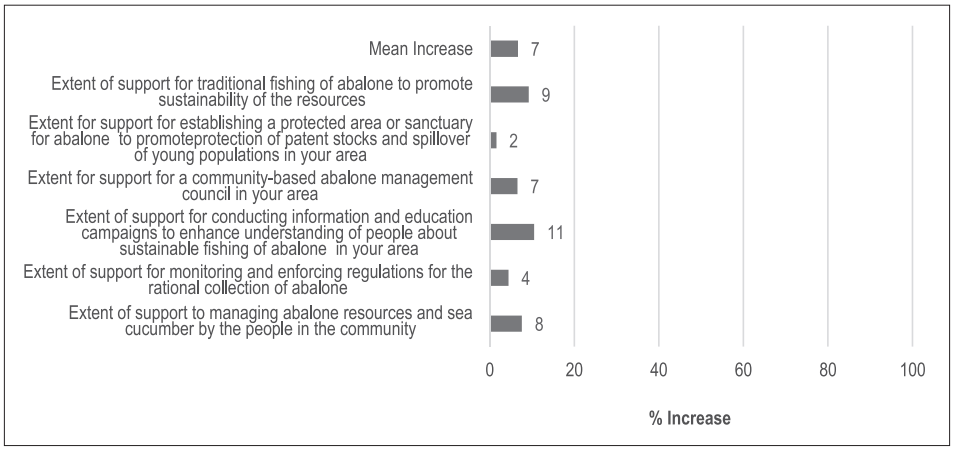

Fig. 6. Bar chart showing percentage increase in attitude toward community-based resource management, monitoring and law enforcement, information and education campaigns, community-based management council, protected area establishment and traditional fishing of abalone due to the project

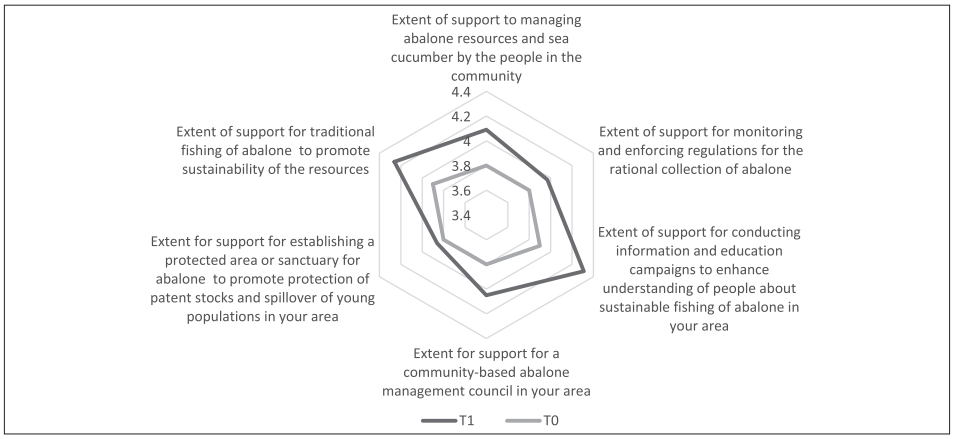

Fig. 7. Radar chart showing mean extent of attitude toward community-based resource management, monitoring and law enforcement, information and education campaigns, community-based management council, protected area establishment and traditional fishing of abalone before and after the project

The initial perceptions of fishers on benefits of abalone protected area management were already high with mean ratings ranging from 3.97 to 4.0 (Substantial benefit) across perception statements. The ratings across perception statements about abalone protected area management benefits were similarly high after the project ranging from 4.04 to 4.31 (Substantial benefit) (Table 4).

The project posted the highest gain on perceived increase in abalone population due to protected area establishment and enhancement of ecological functions of surrounding coastal ecosystems (8%), followed by perceived increase in income due to establishment of abalone protected area (4%).

Overall, the project created a six percent (6%) increase in perceptions about the benefit of abalone protected area management.

The increase in perception towards benefits of abalone protected area management was relatively small which only ranged from 4 % to 8 % across perception of benefit statements (Figure 8). However, it is evident that the change created on perceptions were substantial as shown by the wide differences between the perception ratings before and after the project implementation (Figure 9).

Perceived Usefulness of Community-based Stock Enhancement in Increasing Catch, Reduced Fishing Time, and Bigger Size of Catch

Initially, among all perceptions of usefulness of community-based stock enhancement, the perception that cooperation in community-managed abalone stock enhancement would make it less time consuming to collect the resources in closer areas posted the relatively lowest rating (mean=3.90, Agree).All other perception statements posted almost similarly higher rating ranging from 4.13 to 4.30 (Agree) After the project implementation, all perception statements posted higher rating ranging from 4.35 to 4.39 (Agree) (Table 5).

The intervention created the biggest change in perceived lesser time in collecting the abalone resources in closer areas (12%), followed by perceived increase in catch due to cooperation in community-managed abalone stock enhancement (4%). The perception that cooperation in community-managed abalone stock enhancement would increase catch posted the lowest change at 4% between the two periods.

The increase in perception on the usefulness of community-based stock enhancement was relatively small merely ranging from 2% to 12% (Figure 10). However, it

Table 4. Percentage increase in perceived benefits of abalone protected area management in increasing stock population, fishing income, and enhancing ecological functions before and after the project

Perception Statements	T_1	T_0	T_1-T_0	% increase
Abalone protected area establishment will increase its population in the area	4.31	4.00	0.31	8
Abalone protected area establishment will increase income from collecting abalone in the area	4.04	3.90	0.14	4
Abalone protected area establishment will enhance ecological functions of surrounding coastal ecosystems in the area	4.31	4.00	0.31	8
Grand weighted mean	4.22	3.97	0.25	6

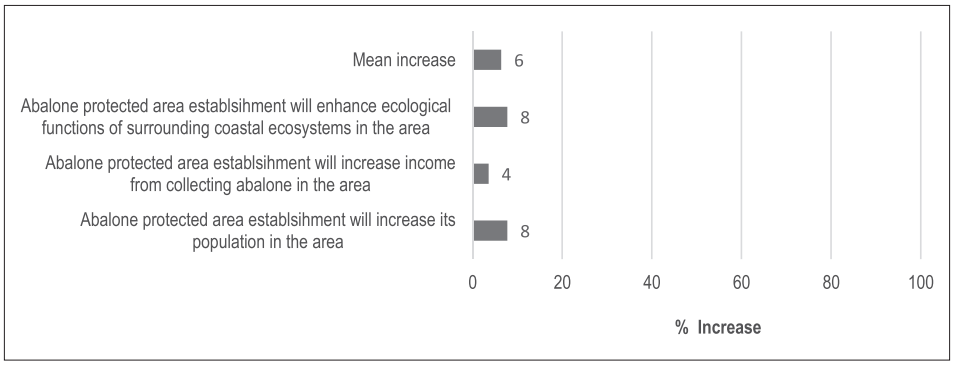

Fig. 8. Bar chart showing percentage increase in perceived benefits of abalone protected area management in increasing stock population, fishing income, and enhancing ecological functions due to the project

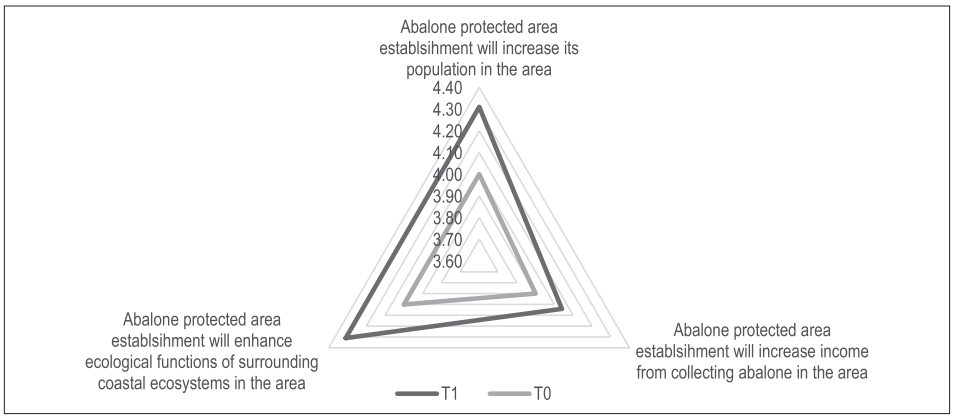

Fig. 9. Radar chart showing mean extent of perceived benefits of abalone protected area management in increasing stock population, fishing income, and enhancing ecological functions before and after project

Table 5. Changes and percentage increase in perceived usefulness of community-based stock enhancement in increasing catch, reduced fishing time, and bigger size of catch before and after the project

Perception Statements	T_1	T_0	T_1-T0	% Increase
Cooperation in community-managed abalone stock enhancement would increase my catch	4.35	4.20	0.15	4
Cooperation in community-managed abalone stock enhancement would make it less time consuming for me to collect the resources in closer areas	4.37	3.90	0.47	12
Cooperation in community-managed abalone stock enhancement would allow me higher number and bigger size catch of the resources	4.39	4.30	0.09	2
Grand weighted mean	4.37	4.13	0.24	6

created wide change differential for the perception that community managed abalone stock enhancement would make it less time consuming to collect the resources in closer areas (Figure 11).

Perceived Ease of Implementation in Collecting Abalone, Accessing Information for Abalone Stock Enhancement, Sustaining Community-Based Stock Enhancement, Understanding and Compliance of Abalone Protected Area as Management Tool

The initial rating on perception of respondents toward finding the information for abalone stock enhancement was the lowest (mean=0.30, Undecided) among the perception statements on ease of implementation and compliance. The rest of the perception statements got higher ratings ranging from 4.0 to 4.10 (Agree). After the project implementation, the low rating on perception towards finding the information for abalone stock enhancement increased and caught up with the rest of the perceptions in which all have posted ratings of 4.10, except for perception that sustainable collection of abalone would be easy (Table 6).

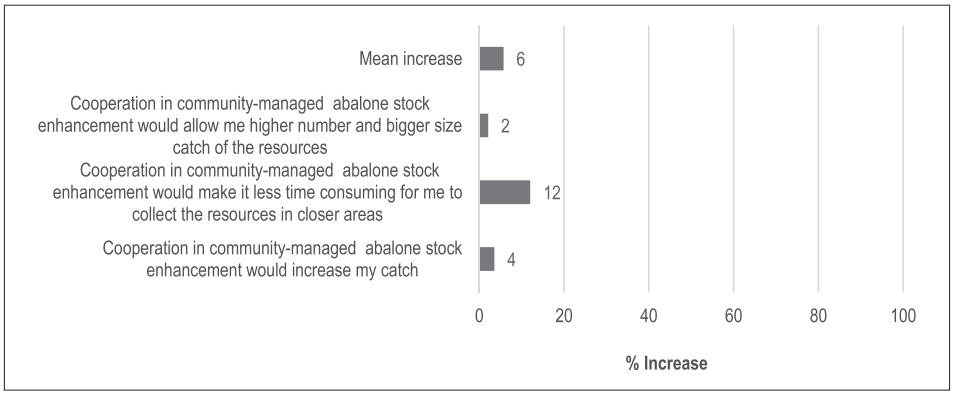

Fig. 10. Bar chart showing percentage increase in perceived usefulness of community-based stock enhancement in increasing catch, reduced fishing time, and bigger size of catch due to the project

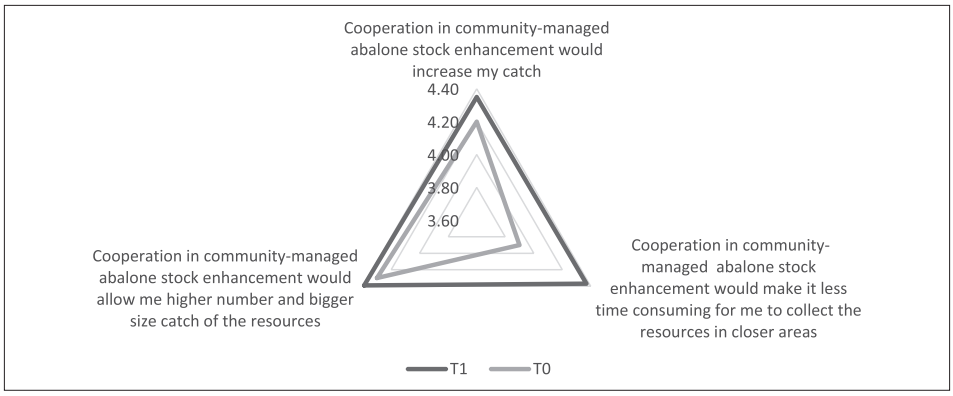

Fig. 11. Radar chart showing mean extent of perceived usefulness of community-based stock enhancement in increasing catch, reduced fishing time, and bigger size of catch before and after the project

The perception on the sustainable collection of abalone being easy posted a slight negative percentage change after the project (-05%). This is attributed to the IEC intervention of the project which inculcated enforcement of regulations to control resource use behavior to support sustainable resource utilization, resulting to deeper understanding related to the perceived halfhearted implementation of resource use policies of the past.

The project created much impact in terms of increasing the perception on finding the information for abalone stock enhancement very easy. It posted an increase of 8% after the project implementation.

The increase in perception on the ease of implementation and compliance on abalone resource management was also relatively small merely ranging from a low of 2% to a high of 8% (Figure 12). However, it created wide change differential for the perception that the information for abalone stock enhancement are easy to find (Figure 13).

Table 6. Changes and percentage increase in perceived ease of implementation in collecting abalone, accessing information for abalone stock enhancement, sustaining community-based stock enhancement, understanding and compliance of abalone protected area as management tool before and after the project

Perception Statement	T_1	T_0	T_1-T_0	% Increase
Adopting sustainable abalone collection strategies would be easy for me	4.08	4.10	-0.02	-0.5
I would easily find the information I am looking for abalone stock enhancement	4.10	3.80	0.30	8
I would find the community-based stock enhancement of abalone easy to implement and sustain in our community	4.10	4.10	0.00	0
I would find the abalone protected area as a management tool simple to understand and easy to comply	4.10	4.00	0.10	2
Grand weighted mean	4.10	4.00	0.10	2

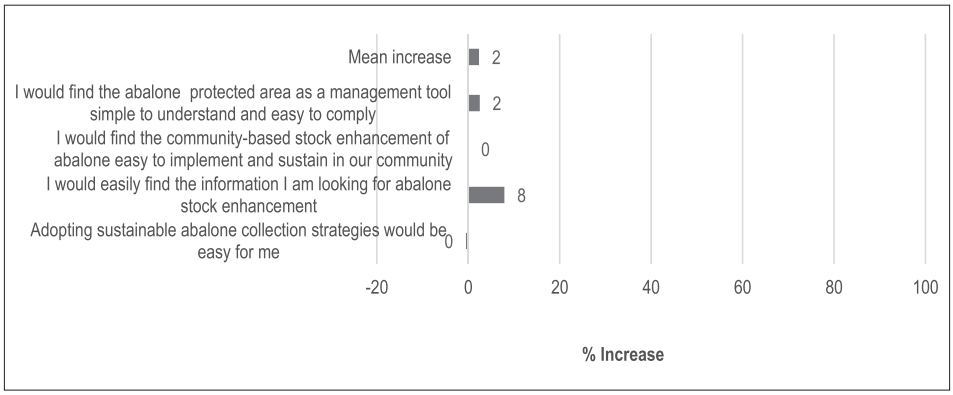

Fig. 12. Bar chart showing percentage increase in perceived ease of implementation in collecting abalone, accessing information for abalone stock enhancement, sustaining community-based stock enhancement, understanding and compliance of abalone protected area as management tool due to the project

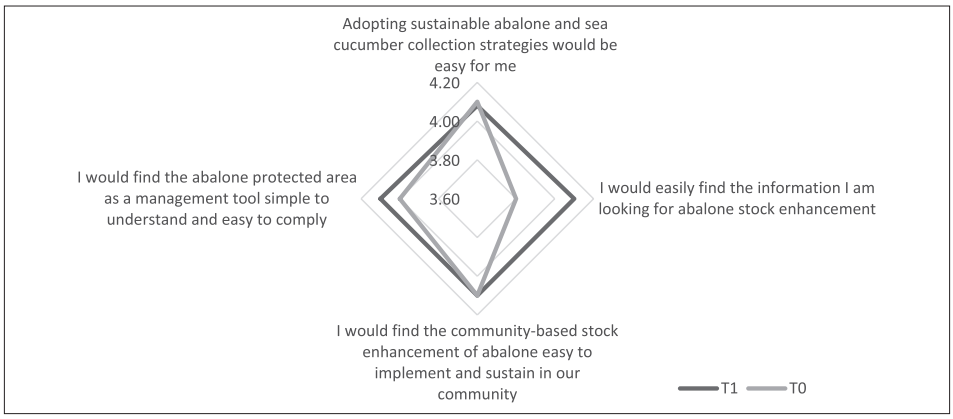

Fig. 13. Radar chart showing mean extent of perceived ease of implementation in collecting abalone, accessing information for abalone stock enhancement, sustaining community-based stock enhancement, understanding and compliance of abalone protected area as management tool before and after the project

Discussion

Among the knowledge constructs evaluated for changes attributable to the social marketing interventions, the resource users' understanding about protected area or sanctuary for abalone, and stock enhancement in coastal area posted wide changes of 40% to almost 60% increase from their narrow initial knowledge baselines respectively. It is interesting to note that the knowledge about community-based stock enhancement of abalone in coastal area registered the widest change, with an almost 100% increase from the narrow baseline data before the project interventions. These encouraging changes in knowledge could be attributed to the reputation and expertise through experience in community-based abalone stock enhancement and resource management by SEAFDEC scientists who joined PSU team during the community advocacy and field research works.

It could be noted that among the knowledge constructs that posted low percentage change are those related with knowledge concepts that are time and implementation results-specific such as the knowledge on the status of abalone resource and the knowledge on effect of habitat condition to abalone resource productivity which were made known to the resource users during and after the project when the habitat and resource assessment had been completed. Nevertheless, these findings suggest that the resource users' understanding about resource management and conservation concepts respond to advocacy and IEC activities of social marketing intervention.

Despite the wide margin of difference on the state of knowledge of resource users on the abalone fishery management and conservation concepts before and after the project which demonstrated higher percentage of increase in knowledge, the fact that the extent of knowledge for the constructs did not reach a maximum (5=Sufficient knowledge), indicated that there is so much more to do to upscale their level of understanding to generate increased positive behavioral intention. These changes augur well for

future plans to pursue and scale up abalone resource management and stock enhancement in the island.

Most of attitude constructs posted relatively low mean ratings before that project but increased moderately after the project. The changes created by the intervention on attitude of resource users registered marginal percentage increase with all barely posted improvement beyond 10%. The relatively lowest marginal change was observed for attitude supporting the establishment of a protected area for abalone to protect parent stocks and promote spillover of young population recruits in the area (2% increase), as well as attitude supporting the monitoring and enforcement regulations for the rational collection of abalone (4% increase). Linking these results for attitude constructs with the results generated for knowledge constructs suggest the project activities created much changes in knowledge as much as they created much changes in attitude. It appeared that the wide change created in knowledge did not translate to wide extent of attitude of support for the establishment of abalone protected area as well as for monitoring and law enforcement to promote sustainable use of abalone resource through the protected area.

This attitude demonstrating low support for abalone protected area establishment could be explained by the fact that the abalone fishery provides the most accessible and affordable safety valve for food insecurity in the employment opportunity-scarce island community. The establishment of a protected area is perceived as a constraint to their source of food and livelihood, unmindful of their sustainability over years. This behavior is common in poor fishing communities where fishers often demonstrate behavior which is consistent with an inability to delay economic gratification. An individual‘s willingness to trade current for future consumption can be measured by one‘s private discount rate. Understanding fishers‘ discount rates is important for fisheries management because fisheries economics theory suggests that overexploitation occurs when fishers‘ discount rates are high i.e., they prefer receiving an immediate, certain, smaller benefit over future, uncertain, but potentially larger benefits (Teh et al., 2011).

The second lowest marginal attitude of support was registered for the attitude construct on the extent of support for monitoring and enforcing regulations for the rational collection of abalone. This all the more strengthened the aversion attitude of resource users to be unrestrained in harvesting abalone fishery resource demonstrating the general impatience which lead them to engage in outright destruction of the very resource where their livelihood depends. This marginal change in this attitude construct highlighted the low discount rates among resource users which serve as key barriers in implementing abalone resource management which need to be treated with focus and importance.

Surprisingly, unlike the measure of respondents' knowledge and attitude before the intervention which posted differential mean low ratings, the respondents' measures of acceptance of abalone resource management as a social technology, better known as social innovation (Farmer et al., 2018) posted consistently higher mean ratings in most of the constructs for the same pre-intervention period. These acceptance measures borrowed from extended UTAUT model equate to behavioral intent to participate in abalone resource management process. For instance, the constructs used for performance expectancy which generally point toward perceived benefits of abalone protected area management registered and the perceived usefulness of community-based stock enhancement pre-intervention mean ratings ranging from 3.9 to 4.0 which descriptively equates to substantial benefit. While the same observation holds true for the constructs used for effort expectancy which generally point toward perceived ease of implementation of abalone resource management registered pre-intervention mean ratings ranging from 3.9 to 4.30 which descriptively equates to substantial benefit.

The high mean pre-project ratings for all measures of acceptance of abalone resource management as a social technology which depict their positive behavioral intention to adopt the social technology (which equates with cooperative behavior) explained for the narrow changes observed for almost all of the constructs between pre and post project implementation. However, the relatively wider change (12%) observed for expectancy of ease of abalone gleaning due to the effect of community-managed stock enhancement affirmed that the information on the positive effects of stock enhancement on productivity of natural abalone stocks would generate buy-in from resource users for resource management interventions that promote sustainability. Similarly, the relatively large change observed for expectancy of ease of finding information for abalone stock enhancement and resource management depicted the significant impact of providing accessible information about the social technology to resource users in encouraging acceptance of and willingness to actively support and participate in the proposed abalone stock enhancement and resource management in Lahuy Group of Islands.

Summary, Conclusion and Recommendations

Overall, the project IEC and other advocacy campaigns through social marketing as a social preparation intervention created positive changes on knowledge and attitude, of resource users on abalone fishery resource management and stock enhancement in Lahuy Group of Islands.

These changes in knowledge, attitudes and perceptions

affirmed the significant accomplishment of the project in initially building the behavioral intent of resource users toward participation in abalone resource management and stock enhancement. But the narrow differences in KAP mean ratings which represent the amount of change achieved between the two time periods due to the project, reflected the compelling need for a sustained effort towards trust building in order to widen and deepen community support for the management of abalone in the context the fishery as a socioecological system.

Of particular interest are the relatively small changes observed for constructs under the UTAUT which equate the resource users' perception on the utility of the abalone resource management as a social innovation with behavioral intent to participate in the processes for community-based abalone fishery resource management as a form of technology adoption. These significant constructs serve as antecedent of willingness to participate or support the proposed resource management intervention to achieve sustainable utilization and governance. The performance expectancy construct in an UTAUT model is the strongest predictor to individual behavioral intentions; while the effort expectancy has a significant impact on behavioral willingness (Zhou, 2021). In the context of the UTAUT model, the performance and effort expectancies influence behavioral intention via the cognition-affect pathway towards forming an attitude. Attitude is a psychological construct that is mental (cognition) and emotional (affect) that inheres individuals to approach something, or their personal view on it. Attitude involves the resource users' mindset and feelings. Many studies linked the influence of culture in the development of attitude (Abdul Razhid et al., 2004).

These initial project outcome highlighted the influence of pervading culture in fishing communities as a key challenge that needs to be understood and addressed in evolving an attitude that brings about a behavioral intention supportive to abalone fishery resource management. In this context, the narrow changes in attitude-related constructs measured through KAP survey indicated that a two-year project implementation would not be adequate to transform knowledge into attitude over short period of engagements. No less than the Rare, an international fisheries conservation NGO that implemented the Rare Pride Campaign pioneering social marketing in selected fishing communities worldwide, confirmed by narrating their experiences lamenting that the time frames of previous evaluations have been too short to measure impacts on biological targets, which may require longer recovery times (Salazar et al., 2019).

The complicated nature of humans as actors compared with biological targets as resource units, and the intertwined nature of attitude with culture as well, make these UTAUT constructs of willingness to adopt social innovation as antecedents of behavioral intent to participate in abalone fishery resource management more wicked to deal with and requiring longer period of engagement to effect community unlearning and learning. These situations underscored the reality about the abalone fishery as a socioecological system, where the variables that influence sustainable resource governance, do not only limit to the parameters of the resource units i.e. growth, recruitment and mortality of stocks, but also the parameters that characterize the actors i.e. perceptions, attitude and culture.

Ecosystems not only consist of physical attributes, they are subjected to and influenced by cultural perceptions as well. 'Landscapes are culture before they are nature; constructs of the imagination projected onto wood water and rock' (Verschuuren, 2017). The pervading cultures of fishers to discount the future and fish food sharing or *baruri* defined the cultural landscape in many fishing communities in rural Philippines. Discounting the future as a mindset has been formed through evolutionary history where fishers as hunter-gatherers belong to the 'immediate return society' in which sharing was the central rule of social interaction. The rules of reciprocal access, combined with an absence of private ownership in an open access abalone fishery developed resource utilization in the island based on 'primitive communism. The prospect of establishing abalone MPA as a social innovation which seek to create an institution that regulates behavior of resource users, activated the pervading culture of resistance in rural societies of the Philippines that evolved through colonial history. The employment of MPA as a conservation tool is seen to interfere with the way of life in abalone fishing that have already been established their own lens of perceiving quality of the marine environment and techniques of utilizing its resources for subsistence. The communities do not share the same perception of a deteriorating environment, what caused this and how the alarming condition can be corrected such that everyone still benefit from the environment. The survival agenda of the fishing households prevail over their common good in the protection and conservation of whatever resources are available within their immediate environment (Oracion, 2013). The establishment of MPA both as a cultural and political space and as an institution that regulate behaviors of resource users in an open access common pool resource represents power in its varying sources and forms and is commonly seen at the onset to repress and constrain people, but also transforms them into resistant subjects.

Ecosystem-based conservation without cultural considerations is not only insufficient, it risks missing an opportunity to build culturally meaningful alternatives. Approaches to investigating coupled social and biophysical

complexity are needed for addressing the practical and scientific needs of socioecological systems (Berkes 2012). A focus on cultural dimensions helps identify important interactions between coastal resources and social groups, and improves socioecological analyses and management (Poe et al., 2014).

Rural locations have the potential to offer fertile ground for social innovation to thrive. The high level of social capital, cohesion, embeddedness and mutual knowledge among members of rural communities could act as stimuli to social innovation (Steiner et al., 2019). These underscore the need to more serious research on how rurality impacts social innovation or how rural contexts affect the processes and outcomes of social innovation such as the establishment of abalone marine sanctuary-reserve and the implementation of law enforcement to regulate resource users' behavior towards sustainable resource governance of abalone resource in the island.

REFERENCES

Abdul Rashid Z, Sambasivan M, and A Abdul Rahman. 2004. The influence of organizational culture on attitudes toward organizational change, *Leadership & Organization Development Journal*, (25) 2 : 161-179.

Ajzen, I. and D Albarracin. 2007. Predicting and Changing Behavior: A Reasoned Action Approach. In: Fishbein, M., Ajzen, I., Albarracin, D. and Hornik, R., Eds., *Prediction and Change of Health Behavior: Applying the Reasoned Action Approach*, Lawrence Erlbaum, Mahwah, NJ, 3-22.

Andriamalala G, Peabody S, Gardner CJ, and K. Westerman. 2013. Using social marketing to foster sustainable behaviour in traditional fishing communities of southwest Madagascar, *Conservation Evidence*, 37-41 37 ISSN 1758-2067.

Berkes, F. 2012. *Sacred Ecology*, Routledge, 363 pages.

Li, W. 2021. The Role of Trust and Risk in Citizens' E-Government Services Adoption: A Perspective of the Extended UTAUT Model. *Sustainability* 13(14), 7671. https://doi.org/10.3390/su13147671

Oracion, E. 2021. Cultural Resistance to Marine Protected Areas: A Political Anthropological Perspective, *Philippine Quarterly of Culture and Society*, 41 (3-4) 230-251.

Poe MR, Norman KC, and PS Levin. 2013. Cultural Dimensions of Socioecological Systems: Key Connections and Guiding Principles for Conservation in Coastal Environments, *Cultural Dimensions of Coastal Conservation*, 7(3), 166-175.

Salayo ND, Azuma T, abRaisa Joy G.Castela RJG, Barrido RT, Tormon-West DH and T Shibuno. 2020. Stock enhancement of abalone, *Haliotis asinina*, in multi-use buffer zone of Sagay Marine Reserve in the Philippines, *Aquaculture*, (523), 30, 735138.

Salazar G, Mills M. and D Verıssimo. 2019. Qualitative impact evaluation of a social marketing campaign for conservation. *Conservation Biology*, (33), 634-644. https://doi.org/10.1111/cobi.13218

Senachai, P., Julsrigival, J., and R Sann. 2022. Social Marketing Strategy to Promote Traditional Thai Medicines during COVID-19: KAP and DoI Two-Step Theory Application Process. *Int. J. Environ. Res. Public Health* 2022, 19, 8416. https://doi.org/10.3390/ijerph19148416

Steiner A, and S Teasdale. 2019. Unlocking the potential of rural social enterprise, *Journal of Rural Studies* (70), 144-154.

Teh LSL, Teh LCL and UR Sumaila. 2011. Low Discounting Behavior among Small-Scale Fishers in Fiji and Sabah, Malaysia, *Sustainability* 3(6): 897-913; doi:10.3390/su3060897

Verschuuren B. 2017. An overview of cultural and spiritual values in ecosystem management and conservation strategies, *Endogenous Development and Bio-cultural Diversity*, pp. 299-322.

Zhou M, Long, P, Kong N, and KS Campy. 2021. Characterizing Wuhan residents' mask-wearing intention at early stages of the COVID-19 pandemic, *Patient Education and Counseling*, (104) 1868-1877.

Pope, 2008. Evaluation and Accountability Collaborative Quick Tip Series for Extension Faculty Conducting Evaluations, Agrilife Extension, Texas A&M System, https://s3.us-east-2.amazonaws.com/wcasa/old-website-resources/How-to-Calculate-Percent-Change.pdf

Vickers AJ. 2001. The use of percentage change from baseline as an outcome in a controlled trial is statistically inefficient: a simulation study, *BMC Medical Research Methodology*, 1:6.