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Evaluating the Resilience of Traditional Fishing Communities: A Mixed-Method Approach

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A B S T R A C T

This research explores the resilience of traditional fishing communities, particularly the Catmondaan Fishermen's Association (CFA) in Catmon, Cebu. By examining the social and economic conditions of these communities and their interactions with the environment, the study aims to assess patterns of resilience and the relationship between socioeconomic conditions and adaptive capacity. Using a mixed-methods approach, including social and ecological surveys with a Likert scale, the study evaluated fishermen's perceptions of their resilience in traditional fishing practices. The findings indicate that CFA members engage in fishing activities an average of 6.29 days per week, demonstrating significant dedication. Despite challenges such as overfishing, pollution, and economic instability, these communities exhibit a moderate level of resilience, that is perceived as average or satisfactory experiencing neither good nor bad., indicating adequate management of their livelihood conditions. Key areas of strength include awareness of fishing regulations and a strong sense of the fishermen's community. The study's insights can inform targeted interventions and policies to support the sustainability and well-being of traditional fishing communities, promoting more resilient practices in the face of environmental and economic changes.

Keywords: livelihood, socio-economic condition, Catmon Fishermen's Association (CFA), fishing sustainability

INTRODUCTION

Fishing for their livelihoods and have a deep connection to the ocean. These communities often have unique cultures, traditions, and ways of life that have been passed down through generations (Ramírez et al., 2022). They know a lot about the sea and have ways of coping with problems. But nowadays, things are changing fast, like the environment and the economy, which can make life harder for these communities. Community also commonly implies fundamental aspects like a sense of belonging, togetherness, and social engagement (Tjora & Scambler, 2020).

The Philippines, situated in Southeast Asia and composed of thousands of islands, is well-known for its abundant maritime resources and thriving fishing sector. Its vast coastline, spanning over 7,000 islands, contributes greatly to the nation's economy, cultural identity, and everyday existence (Angeles & Mendoza-Dreisbach, 2020). Fishing holds immense importance, deeply ingrained in the fabric of Filipino society, shaping livelihoods and traditions alike. Filipino fishermen, referred to as "mga mangingisda" in the local Tagalog language, hold a central role within coastal communities across the Philippines.

Statista Research Department recorded on February 13, 2024 that in 2022, approximately 1.1 million municipal fishermen were engaging in capture fishing in the Philippines. About 85% of fishers are small-scale fishers who live along the coast, and they catch almost half of the country's fish (RARE, 2024).

In recent years, traditional fishing communities have encountered numerous challenges that threaten their way of life. These challenges include overfishing, pollution, habitat destruction, climate change, and economic instability Nayak, Dias, & Pradhan, (2020). Overfishing, in particular, not only diminishes the abundance of fish species but also disrupts marine ecosystems and undermines the economic viability of local fishing operations Arthur et al., (2022). This highlights the urgent need for sustainable management practices and support for small-scale fisheries to ensure the resilience and survival of these communities and their local food systems.

Despite these challenges, some traditional fishing communities have demonstrated remarkable resilience. Several factors contribute to their ability to withstand and recover from shocks and stressors. This research aims to provide insights into the resilience of fishermen who fish daily with small families, inform policy interventions and support mechanisms, and contribute to the sustainable management of marine resources and coastal communities. Hence, it is also to evaluate the resilience of traditional fishing communities by examining their social and economic conditions while also analyzing the impact

of their interactions with the environment. The primary objective is to assess the existing patterns of resilience among these communities and determine if there is a significant relationship between their socioeconomic conditions and their ability to adapt to environmental changes. The study provides valuable insights that can inform the development of interventions and policies to support the sustainability and well-being of traditional fishing communities.

OBJECTIVES OF THE STUDY

1. To determine the profile of the respondents in terms of:

1.1. age

1.2. Marital status

1.3. Number of household members

1.4. Frequency of fishing trips per week

1.5. average daily income

1.6. financial assistance received, and

2. To allocate the time of the respondents experienced economic hardship?

3. To analyze the level of resiliency experienced by the respondents in terms of:

3.1. livelihood activities

3.2. access to resources

3.3. community dynamics

3.4. perception of change

3.5. adaptive strategies

4. Based on the findings, what interventions can be drafted to promote sustainable fishery management?

MATERIALS AND METHODS

Researchers used a mixed-method approach, combination of social and ecological surveys to assess the resilience of traditional fishing practices among members of the Catmondaan Fishermen's Association (CFA). This mixed-methods approach included observations and questionnaires. The questionnaires were adapted from a study by Shaffril, et. al. (2021) on strengthening social resilience in coastal fishing communities. These surveys used a Likert scale to gauge the fishermen's perceptions of their resilience with regards to traditional fishing practices. All the data was collected and organized using Microsoft Excel and then analyzed using SPSS software.

2.1. Environment & Participants

The study's location was strategically chosen in Barangay Catmondaan, Catmon, Cebu (postal code 6006). Situated within the municipality of Catmon, this barangay boasts a sizeable fishing community, ideal for gathering the necessary data. This selection offered accessibility to the target population – members of the Catmondaan Fishermen's Association – facilitating data collection and ensuring the study's timely completion. Hence, the researchers opted for this location for its convenience and efficiency in achieving their data collection goals.

This study's respondents were exclusively fishermen affiliated with the Catmondaan Fishermen's Association. A multi-stage sampling approach was employed, utilizing purposive sampling with specific inclusion criteria. These criteria ensured participants were: (a) members of Catmondaan Fishermen's Association, (b) in possession of full auditory and verbal communication abilities, and (c) capable of comprehending and conversing in English, Filipino, and Bisaya. Additionally, quota sampling was implemented to guarantee a minimum respondent pool of thirty individuals.

Table 1: Number of Respondents

Respondents	
Members of CFA	57
Number of Respondents	31
Percentage of Respondents	54.38%

2.2. Data-gathering tools and study procedure

The study adhered to two crucial stages: pre-data gathering and data collection with subsequent analysis. The pre-data gathering phase commenced with the preparation of a permission letter seeking approval from the research instructor, the Chair of the Industrial Engineering department, and the President of the Catmondaan Fishermen's Association. Following successful acquisition of these approvals, the researchers meticulously modified a pre-existing survey questionnaire to precisely align with the study's objectives. After validating the instrument, the researchers proceeded to Barangay Catmondaan for data collection. The survey comprised demographic inquiries alongside 15 questions measured using a 5-point Likert scale. These questions assessed the respondents' perceptions concerning resilience in traditional fishing practices. The researchers aimed to gather a minimum of 30 responses, anticipating a completion time of 5-10 minutes per participant. Ultimately, 31 fishermen participated within the designated timeframe, fulfilling the predetermined quota.

2.3. Statistics & Scoring Procedure

To ensure efficient and accurate evaluation of the quantitative data, researchers employed statistical methods. Data obtained from the administered 5-point Likert scale questionnaire, reflecting the fishermen's responses, was systematically organized within a Microsoft Excel spreadsheet. A descriptive statistical analysis, specifically the weighted mean, was utilized to analyze the fishermen's perceptions regarding their resilience in traditional fishing practices. The derived insights can serve as a foundation for proposing the development of targeted interventions and policies, support mechanism within the fishing industry. These interventions could foster a more resilient fishing environment that empowers fishermen to navigate challenges effectively and contribute to the sustainable management of marine resources and coastal communities.

The questionnaire employed a 5-point Likert scale to measure the fishermen's perceptions. This scale ranged from 1 (low) to 5 (high). The fishermen's responses corresponded to the Likert scale values were then scored and categorized based on the following pre-established criteria:

Table 2: The scoring of the perceptions of the respondents on their traditional fishing resilience

Weight	Range	Category	Description
5	4.21 – 5.00	High	Respondents perceive this aspect as exceptional. They face minimal challenges and are very satisfied with their situation
4	3.41 – 4.20	Medium – High	Respondents perceive this aspect positively. They experience fewer difficulties and can easily manage their need
3	2.61 – 3.40	Medium	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
2	1.81 – 2.60	Medium – Low	Respondents perceive this aspect as below average or somewhat challenging. There are notable difficulties, but they manage to cope to some extent.
1	1.00 – 1.80	Low	Respondents perceive this aspect of their fishing experience as extremely deficient or challenging. They face significant difficulties, and the situation is far from satisfactory.

RESULTS

This chapter provides an analysis and interpretation of the data collected in the study. The purpose is to determine the average duration of the members of the Catmondaan Fishermen Association goes fishing weekly, based on the frequency of their fishing schedule in a week. Additionally, it examines the perception of the fishermen on how they were able to be resilient in coping up with the challenges and the traditional fishing.

A. ***Respondents Mean Time of Fishing***

Table 3: Catmondaan Fishermen Association Mean Time in Fishing Trip per Week

Mean Time of the Respondents Fishing
6.29 Days

In the Table 3 above, it summarizes the average mean time of fishing for the members of the Catmondaan Fishermen Association through getting their mean average of fishing days in a week.

The results at Table 3 revealed that the average mean time of fishing per week for the members of Catmondaan Fishermen Association was 6.29 days.

B. ***Daily Average Profit of the CFA members***

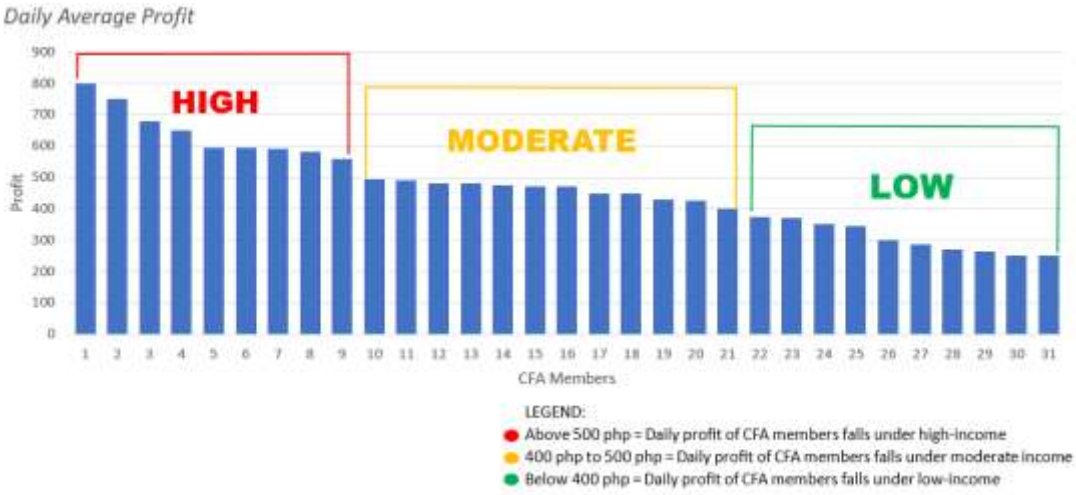

Fig. 1 – Daily Average Profit of the CFA members

Figure 1 shows the daily average profit distribution among CFA (Catmondaan Fishermen's Association) members. The data suggests a moderate skew towards the middle income category, with 50% of members earning between 400 and 500 PHP daily. This could indicate a relatively even distribution of experience or skill levels within the CFA membership.

At the high end, 20% of members enjoy a daily average profit exceeding 620 PHP. These skilled fishers likely possess extensive experience or skills. Conversely, 30% of members fall into the low-income category, averaging 330 PHP daily. This group may consist of newer members or those encountering challenging fishing conditions.

C. ***Members Perception in Fishing Resiliency***

This section presented the summary of results of the survey questionnaire obtained from excel. The collated data interpreted all twelve questions by calculating the weighted mean. The table summarizes the results of the queries to analyze the members of CFA fishing behavior.

Table 4: Catmondaan Fishermen Association Perception in Fishing Resiliency

No.	Question	Mean	Description
1	Average catch per fishing trip (in kg)	2.39	Respondents perceive this aspect as below average or somewhat challenging. There are notable difficulties, but they manage to cope to some extent.
2	Perception of changes in fish abundance over the past few years	3.26	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
3	Access to secure fishing grounds	3.19	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
4	Awareness of fishing regulations in the area	4.35	Respondents perceive this aspect as exceptional. They face minimal challenges and are very satisfied with their situation
5	Challenges in accessing of fishing equipment	3.35	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
6	Sense of community within the fishing village	4.19	Respondents perceive this aspect positively. They experience fewer difficulties and can easily manage their need

7	Involvement in community organizations	2.52	Respondents perceive this aspect as below average or somewhat challenging. There are notable difficulties, but they manage to cope to some extent.
8	Effectiveness of community support mechanisms	2.45	Respondents perceive this aspect as below average or somewhat challenging. There are notable difficulties, but they manage to cope to some extent.
9	Perception of changes in the marine environment over the past few years	3.29	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
10	Changes in the marine environment impacted your livelihood	3.39	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
11	Adopted coping strategies	2.97	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
12	Reliant on traditional knowledge	3.35	Respondents perceive this aspect as average or satisfactory. Their experience is neither particularly good nor particularly bad. They manage adequately and can meet their basic needs.
OVERALL MEAN = 3.23			

Table 4 illustrates the result of each identified situations for the fishermen to perceive the issues in fishing. It also delves with the overall mean garnered that the fishermen are resilient in regarding traditional fishing.

D. ***Relationship Analysis***

In this section, the analysis of the connection between situational questions and the duration of prolonged sitting among workers. The data was subjected to statistical calculation with the use of Pearson Product Moment Coefficient of Correlation. The table provided a concise summary of the outcomes, indicating whether a significant relationship exists or if the association between the variables is deemed not significant.

Table 5: Summary of correlation between questions and no. of days

VARIABLES	**Tabular r- Value (0.455631)**	**CORRELATION**
Question 1 & Days	0.090	Significant Relationship
Question 2 & Days	-0.264	Significant Relationship
Question 3 & Days	0.035	Significant Relationship
Question 4 & Days	-0.006	Significant Relationship
Question 5 & Days	0.180	Significant Relationship
Question 6 & Days	-0.163	Significant Relationship
Question 7 & Days	-0.200	Significant Relationship
Question 8 & Days	-0.121	Significant Relationship
Question 9 & Days	-0.133	Significant Relationship

Question 10 & Days	-0.251	Significant Relationship
Question 11 & Days	-0.203	Significant Relationship
Question 12 & Days	-0.334	Significant Relationship

DISCUSSION

The results at Table 3 revealed that the average mean time of fishing per week for the members of Catmondaan Fishermen Association was 6.29 days. This consistent engagement with fishing activities suggests a level of resilience within the Catmondaan Fishermen Association, as they maintain their commitment to their livelihood despite potential challenges. This resilience aligns with research by Pleños and Presbitero (2021), who observed similar patterns in fishermen from Hilongos Leyte. Their study revealed that fishermen in that region also averaged six days of fishing per week, with a significant portion, approximately 61.9%, engaging in fishing nearly every day or six to seven days each week. These findings collectively highlight the steadfast dedication of fishing communities to sustaining their way of life, even in the face of challenges.

Based on the results presented in Table 4, the calculated overall mean score of 3.23 for the twelve situational questions suggests that the majority of fishermen in Catmondaan perceive their situation as average or satisfactory. This score indicates that their experiences are neither particularly good nor particularly bad. They are managing adequately, implying that while they do not face severe hardships, they also do not enjoy significant prosperity. This middle-ground perception reflects a state where they can meet their basic needs and maintain a certain level of stability. Their ability to manage adequately means they are capable of sustaining themselves and their families, but they are not experiencing a high level of well-being or security. The overall sentiment among the fishermen is one of moderation, where their living conditions and work experiences are just sufficient to get by without substantial difficulties. The degree to which a system can self-organize, maintain its control over function and structure, and develop its ability to learn how to adapt and cope are all indicators of resilience (Turner et al., 2022). Human acts that maintain development along current paths are referred to as resilient. exploits disruptions as a chance to gain an edge (Galappaththi et al., 2019).

With a mean of 4.35, the fishermen are fully aware of the fishing regulations in Catmondaan. They perceive this aspect as exceptional. With a mean of 4.19, the respondents have a positive perception of the sense of community within the village. This indicates that the fishermen in Catmondaan feel a strong sense of belonging and support among their neighbors. They likely experience good relationships, cooperation, and mutual assistance within their community.

On questions 2, 3, 5, 9, 10, 11, and 12, the respondents perceive the aspects as average or satisfactory. Their experience is neither particularly good nor particularly bad. They observe some changes in the abundance of fish over the past few years, indicating a slight but noticeable variation in their catch. While they can access fishing grounds, it is adequate but not optimal. They face small challenges in securing fishing equipment, reflecting moderate difficulties. Their perception of changes in the marine environment over the past few years is also average, indicating that while they notice some environmental shifts, these are not extreme. These changes have had a moderate impact on their livelihoods. Their coping strategies are light, suggesting they are managing but without significant resilience. Additionally, their reliance on traditional knowledge is rated as average, showing a balanced but not particularly strong dependence on customary practices. All these aspects are rated as satisfactory, indicating a middle-ground perception where conditions are manageable but not ideal.

A mean of 2.39, 2.52, and 2.45 falls below average or indicates somewhat challenging conditions. Respondents see that their catch per fishing trip is not abundant, rating it just below average or somewhat challenging. Their involvement in community organizations is not very active, but it is acceptable. Additionally, respondents perceive the effectiveness of community support mechanisms as below average, indicating that these support systems are not meeting their expectations or needs effectively.

Table 5, it presented the relationship analysis of the variables. In accordance to Field et. al (2021), it was stated that if the r-computed value is less than r-tabular negative value or r-computed value is greater than r-tabular positive value, then their relationship is significant. Hence, for table 5 it illustrated the result calculation from Pearson Product Moment Coefficient of Correlation through the used of IBM SPSS software in regards to the correlation between the situational questions and the average number of fishing trip in a week of the members of the CFA, and upon the meticulous process, it reveals that there is a significant relationship or association between variables.

CONCLUSION

In conclusion, the average mean time spent on fishing per week by the members of the Catmondaan Fishermen Association was found to be 6.29 days. This finding highlights the significant commitment of the association members to their livelihood and fishing activities. Their consistent engagement with fishing, averaging over six days per week, emphasizes their resilience and dedication despite the potential challenges they may face in their environment. This commitment contributes to the sustainability of their livelihoods and underscores the importance of supporting and understanding the needs of fishing communities like Barangay Catmondaan. The association between the fishermen's resilience perception and their number of fishing trips sheds

light on the importance of adhering to socio-economic adoption to mitigate the adverse effects of ecological changes in the marine environment, emphasizing the need for policy interventions or programs to mitigate dissatisfaction associated with the CFA members' resilience.

RECOMMENDATIONS

` Based on the findings of our study on the resilience of the Catmondaan Fishermen's Association, several interventions can be proposed to promote sustainable fishery management and enhance the resilience of the fishing community.

- To improve fishing yields and equipment access by providing subsidies or low-interest loans for equipment purchases and implementing training programs on sustainable fishing techniques.
- Enhancing marine resource management through the establishment of Marine Protected Areas (MPAs) and rigorous enforcement of fishing regulations can help replenish fish stocks and maintain biodiversity.
- Strengthening community and organizational involvement is also vital, which can be achieved by promoting participation in community organizations and building effective support mechanisms such as cooperatives.
- Adapting to environmental changes requires implementing climate adaptation strategies and conducting regular environmental impact assessments.
- Leveraging both traditional knowledge and modern practices, as well as facilitating economic diversification and support through financial assistance and access to markets, can further contribute to sustainable fishery management and the long-term well-being of the fishing community through training and seminars.

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