International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Policy Advocacy Towards the Influx of Fish Cages in Sula Channel Sula Bacacay, Albay: Protocol Entry

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ABSTRACT

This paper provides an analysis of the stakeholder's perception about the influx of fish cages in Sula Channel, Bacacay, Albay to examine the concerns raised about the impacts of fish cage farming on marine ecosystem, livelihood and the community. The study was implemented in collaboration with barangay officials and fishers and community members. Data collection was carried out from a randomly selected 63 key informant-respondents. The interview consists of key points towards identification of the perceived environmental and socio-economic impacts of fish cages. All data were analyzed using descriptive statistics. Result showed that diverse group of participants were dominated by middle-aged females with families, and highlights the importance of various fishery-related professions beyond just fishing itself. However, a significant portion falls under the low-income category. Respondents expressed moderate agreement that fish cages contribute to water pollution and restrict channel space. However, opinions were less clear on the impact of cages on water flow and their placement relative to other resources. Overall, the findings suggest a negative perception of the environmental benefits of fish cages. While there's moderate agreement that fish cages create employment, there's strong disagreement that they provide income for the community as a whole. Similarly, residents don't feel they have opportunities to own cages or are well-informed about the project's value. Additionally, fish cages are not seen as a tourist attraction. Overall, the perception leans towards a negative view of the social and economic impacts of fish cages in the community. It is recommended that massive information, education and communication campaign be implemented.

Keyword: Policy advocacy, fish cages, environmental impact and eutrophication

INTRODUCTION

Fish is a vital component of the diet of the Filipinos. It is also very important to local economy being the sources of livelihood in many coastal communities. Focusing on policies that support food security within the limits of what nature can provide is therefore a promising area of research. Towards this end, initiatives and policies that advocate sustainable food systems is worth implementing.

The rapid increase in the number of fish cages in Sula Channel has raised concerns about the benefits and costs of fish caging. While it is a fact that fish cage farming stabilizes fish supply and huge economic returns, it also creates problems associated to the ecosystem, biodiversity, and local communities. Records in the Barangay of Sula shows that from May 2015 to September 2020, fish cage structures increased by 35%. The observed consequences of such development showed that cage and pen structures affect water body in three principal ways: they take up space, thus potentially competing with other users; they alter flow regimes which govern the transport of oxygen, sediment, plankton and fish larvae; they have an impact on the aesthetic qualities of the site (Alemanya, 2017). Infrastructure development has an impact in our environment. According to Jan Van Wyk (2007) environment management tools must be used in the implementation of infrastructure development for sustainable environmental management. Araullo (2019) stated that aquaculture policy must be clear and implemented strictly, otherwise problems in the aquatic environment will continue. Under the Local Government Code, the management of inland water is within the jurisdiction of the local government units with the assistance of the national government. Price, et.al. (2015) look forward that to achieve economically and ecologically sustainable marine aquaculture, optimal siting and best management practices should be put in place. While fish cage and fish culture is economically important, several studies show that environmental problem is still eminent (Israel, 2008).

Excess nutrients from uneaten feed and fish waste can accumulate around cages, leading to eutrophication. This can cause algal blooms, oxygen depletion, and disrupt the natural ecosystem balance. (Wu, 2015; Fernandes et al., 2020). Organic matter from fish waste can increase biochemical oxygen demand (BOD), reducing oxygen levels in the water and harming aquatic life. Additionally, antibiotics and other chemicals used in aquaculture can also impact water quality. (Beveridge, 2014; Naylor et al., 2019). he accumulation of organic matter on the seabed below fish cages can smother benthic organisms and alter sediment composition. This can disrupt the food chain and impact bottom-dwelling fish populations. (Holmer et al., 2015; Karakassis et al., 2018). Escaped fish from damaged cages can interbreed with wild populations, potentially impacting genetic diversity and disrupting native fish stocks. (McGinnis et al., 2016; Yamamoto et al., 2018). Concentrated fish populations in cages can provide breeding grounds for parasites and diseases. These can spread to wild fish populations, impacting their health and survival. (Junge et al., 2014; Mohammed et al., 2019).

On the basis of the above context, this protocol entry intended to determine the profile, and perceived environmental and socio-economic impact of the influx of fish cages in Sula Channel Sula Bacacay, Albay. This research also leans on conducting a comprehensive study about the current fish cages farming industry which provides vital and valuable information and insights for policy makers, local authorities and stakeholders develop management strategies that harmonize economic agenda with environmental sustainability. In essence, an advocacy for a balance sustainable development and promotion of a resilient coastal communities.

The research is significant in recommending regulations to minimize pollution from fish cage waste, promoting sustainable aquaculture practices that protect the health of the Sula Channel ecosystem. This could benefit. A healthy Sula Channel would support fish populations and ensure sustainable livelihoods for local fishermen who depend on the channel's resources. Sustainable practices can help conserve the diverse marine life in the channel.

METHODOLOGY

Study Area

The study setting is located in Barangay Sula in Cagraray island Bacacay Albay at coordinates are 13.2397, 123.8607 (13° 14' North, 123° 52' East) with an estimated elevation of 15.04 meters above sea level Figure 1. The household population of Sula in 2022 was 1578 broken down into 225 households or an average of 5.78 members per household. Sula shares common boarders with Mataas Bacacay Albay. Tambongon Bacacay Albay, Damacan Bacacay Albay, Bariw Bacacay Albay, and Alimsog Santo Domingo, Albay.

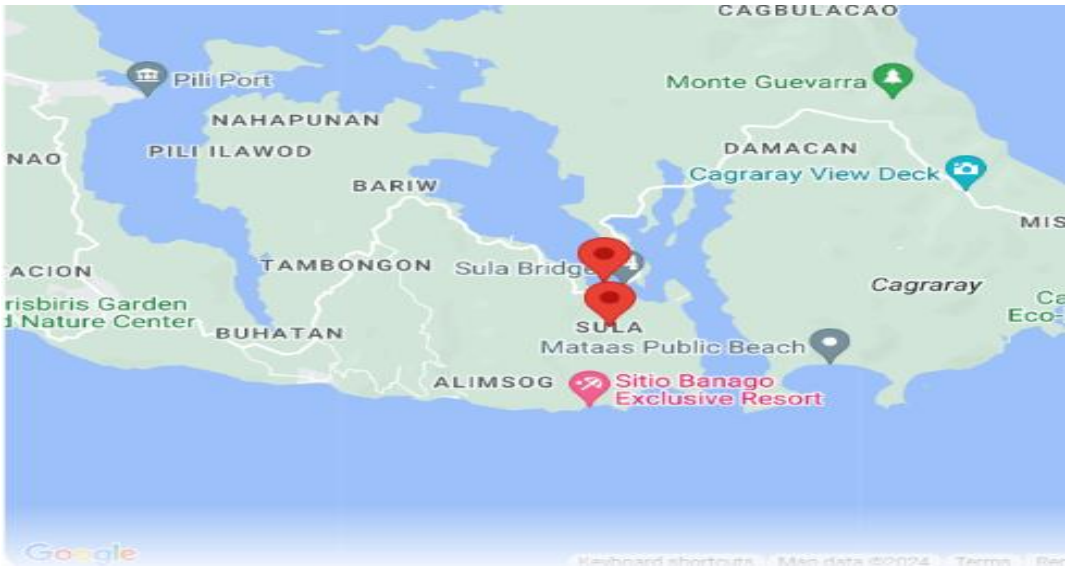

Figure 1. Location map of Bacacay Albay which situates Sula Channel

Source: https://rapidnewsonline.com/albay

Presently, it is the site of sea cage farming of milkfish (*Chanos chanos* Forksal) locally known as "bangos" that spread throughout the Sula Channel and the subject of interest of the present study. The study was conducted in Barangay Sula Bacacay Albay.

Protocol entry was done on June 17, 2023. The team coordinated with the barangay council of Sula Bacacay, Albay regarding the proposed project and presented the objectives of the research. First general assembly meeting on the awareness of the project was held on August 20, 2023.

Research Design

The study made use of qualitative research methods and was implemented using a participatory approach. Data collection considers the methods of participatory social assessment with key informant interview, survey and focus group discussion as the make data collection tools. This research adopted the approach used by Maria Gemma Iturralde, Dr. Della Grace Bacaltos, and Eva Lynn Pili (2010) which contributed in the attainment of the goals and objectives of their study on "Declaration of Marine Protected Areas (MPA) in Davao City for Endangered Pawikan." The method was designed with four components as follows Component

1. **Protocol Entry**. Designed to conduct awareness, profiling, determine the perceived soci-economic and environmental impact. Component

2. **Training work-shop on Aquatic Marine Resources Conservation**. This is intended to increase the awareness of public officials such as municipal and barangay officials and legislators to enable them to formulate effective ordinances, manage public consultations, and educate the members of the community. Component
3. **Information, Education, Communication**, **Policy Advocacy and Local Legislation**. Guide local legislators such as the municipal and barangay council to formulate effective ordinance in regulating the influx of fish cages and protection of aquatic resources. Generate support from public and private organizations such as BFAR, DENR, ad Media Broadcast in the promotion of the program. Componen..
4. **Evaluation**. This final phase will allow the stakeholders to give feedback of the implementation of the project, what gains were achieved, how it will proceed once this project ends, and what steps should be made or plans to sustain gains.

This method was chosen since this research follows germane goals and objectives on aquatic and marine resources policy advocacy. This research applied **Protocol Entry** designed to promote awareness conducted during the barangay council session and assembly meeting (Iturralde et.a l., 2010).

Research Respondents

This activity was participated by the barangay officials and residents to help them understand the importance of policy formulation and implementation through public consultation. A total of 63 randomly selected participants-respondents involving fishermen, housewives, and other stakeholders participated during the data gathering.

Data Gathering Instrument

Survey questionnaire was used to determine the profile of the residents in Barangay Sula, perceived environmental and socio-economic impact of fish cages in Sula Channel. Profile of the respondents was composed of the respondents' age, gender, civil status, number of children, source of income/classification, educational attainment, monthly income, length of fishing experience, and other source/sources of income. The perceived environmental impact covers the awareness of the residents on how the fish cages affect Sula Channel. The perceived economic impact of fish cages covers the opportunities it offers in Sula.

The survey instruments were distributed to the residents during the general assembly meeting. Enough time was given to the respondents in filling-out the questionnaire and collected on the same day.

Statistical Treatment of the Data

Descriptive statistics was employed to analyze the profile of the respondents in terms of age, gender, educational attainment, family income, other sources of income, and number of children were tabulated and presented using the frequency counts, ranks, percentages and averages.

The perception in terms of environmental impact and socio-economic impact was measured using the five-point Likert Scales 1-5 and rated according to the following rating: 5- very strongly agree; 4- strongly agree; 3- moderately agree; 2- strongly disagree; and 1- very strongly disagree. For the mean rage and its descriptive rating, the following were used: 4.21-5.00 – very strongly agree; 3.41-4.19—strongly agree: 2.61 – 3.40—moderately agree; 1.80 – 2.60 – strongly disagree; and 1.00 – 1.79 – very strongly disagree.

Average Weighted Mean was used to describe the perception of the respondents. This treatment is an adaptation of the statistical tool used by Urbiztondo et al., (year).

RESULTS

Table 1 shows the distribution of respondents' profile. Results obtained showed that majority of the respondents (60.31%) fall within the 26-45 age group, indicating a focus on middle-aged individuals. This suggests that the survey might have been targeted towards a population in their career prime or those raising a family. The respondent is dominated by females (95.24%). Along marital status, an even distribution between single (47.62%) and married (49.21%) was noted. Majority had 1 to 4 family size. Result also reveal that all respondent's formal education but majority (52.38%) completed secondary education and a few (6.35%) have reach college or vocational courses (1.59). A large portion (68.25%) has an average of 8 children. The "Others" category (71.43%) is the largest, encompassing various fishery-related professions besides fish cage owners (0%) and small-scale fishermen (28.57%). This highlights the diversity of fishery-related jobs in Sula Channel. In terms of monthly income, data reveals that majority are poor (73.01%) earning a monthly income below 5,000. Based from the Philippine Institute for Development Studies (PIDS) of 20232, family monthly income below 10, 957 is classified as poor. This suggests that a considerable portion of fishery participants are low-income earners. The results show a spread across experience levels, with both newcomers (less than 1 year - 12.70%) and those with extensive experience (more than 20 years - 7.94%) present. The "Others" category (61.90%) is the largest source of income, followed by buying and selling (23.80%). This "Others" category likely includes income derived from various fishery-related activities beyond just fishing. This data suggests a profile of fishery participants in Sula Channel who are primarily middle-aged,

Table 1 Profile of the Respondents

Profile	Frequency	Percentage
Age		
15-25	5	7.94
26-35	21	33.33
36-45	17	26.98
46-55	9	14.28
56-64	10	15.87
65-75	1	1.59
TOTAL	**63**	**100**
Gender		
Male	3	4.76
Female	60	95.24
TOTAL	**63**	**100**
Civil Status		
Single	30	47.62
Married	31	49.21
Widowed	1	1.59
Separated	1	1.59
TOTAL	**63**	**100**

Highest Educational Attainment		
Elementary Graduate	25	39.68
High School Graduate	33	52.38
College Graduate	4	6.35
Vocational Course	1	1.59
TOTAL	**63**	**100**
Monthly Income		
Below 5,000	46	73.01
5,000-10,000	16	25.40
10,000-15,000	1	1.59
TOTAL	**63**	**100**
Fish Farming Experience		
Less than 1 year	8	12.70
1-5 years	18	28.57
6-10 years	11	17.46
11-15 years	12	19.05
16-20 years	7	11.11
More than 20 years	5	7.94
TOTAL	**63**	**100**
Source of Income		
Salary from profession	3	4.76
Fishing	5	7.94
Pension	1	1.59
Buying and Selling	15	23.80
Others	39	61.90
TOTAL	**63**	**100**

Table 2 Perceived environmental impact of fish cages in Sula Channel.

Indicator	Weighted Mean	Descriptive Meaning	Rank
1 The sizes of fish cages are suited in the space of Sula Channel	2.76	Moderately Agree	3
2. Fish cage structures help maintain the water flow in Sula channel specially during the transition from high tide to low tie and low tide to high tide.	2.15	Strongly Disagree	4
3. Fish cages are installed in the location that maintains other resources in Sula Channel	1.30	Strongly Disagree	5
4. Fish cages contribute in the accumulation of water waste in Sula Channel.	3.24	Moderately Agree	1
5. Fish cages contribute in the narrowing of the surface of Sula channel.	3.07	Moderately Agree	2
AVERAGE	2.50	Strongly Disagree	

Respondents seem to be more concerned about the negative impacts of fish cages. Perceptions lean towards moderate agreement that fish cages contribute to the accumulation of water waste (3.24) and narrowing of the channel surface (3.07). These results suggest that fish cages may be impacting water quality and potentially affecting navigation in the channel. The data shows less agreement on the impact of fish cages on water flow (2.15) and placement in relation to other resources (1.30). It appears respondents are unsure about the effects of fish cages on water flow during high and low tides. Similarly, the data suggests disagreement on whether fish cages are placed in locations that avoid disturbing other resources in the channel. The average weighted mean (2.50) leans towards disagreement on the positive environmental impact of fish cages.

Table 3 Perceived socio-economic impact of fish cages in Sula channel

Indicator	Weighted Mean	Descriptive Meaning	Rank
1. The introduction of fish cages gave the residents an opportunity to put up their own fish cage/s.	1.79	Very Strongly Disagree	4
2. Some residents are employed or work with fish cage operators.	2.91	Moderately Agree	1
3. The fish cages attract visiting tourists in the community.	2.53	Strongly Disagree	2
4. People are oriented about the importance of having the fish cages in the community.	2.02	Strongly Disagree	3
5. Fish cage management and program is implemented as one of the sources of income in the community.	2.02	Strongly Disagree	3.5
AVERAGE	2.25	Strongly Disagree	

Tale 3 shows that economic benefits (indicators 2 & 5): There is a moderate agreement (2.91) that fish cages provide employment opportunities (indicator 2). However, there is strong disagreement (around 2.02) that fish cage management is a source of income for the community (indicator 5). This inconsistency suggests that while some residents benefit directly through employment with fish cage operators, the overall program might not be generating significant income for the community. Social benefits (indicators 1 & 4): The data shows strong disagreement (around 1.79) that fish cages provide an opportunity for residents to own their own cages (indicator 1). There is also strong disagreement (2.02) that people are informed about the importance of fish cages (indicator 4). This suggests that residents perceive little personal ownership or involvement in the fish cage project, and they might not be well-informed about its potential benefits. Tourism (indicator 3): There is strong disagreement (2.53) that fish cages attract tourists. This indicates that residents do not perceive fish cages as a positive factor for tourism in the community. Overall perception: The average weighted mean (2.25) leans towards a strong disagreement with the positive impacts of fish cages.

Conclusion

This study examined the socio-demographic profile of fishery participants and their perceptions of fish cages in Sula Channel, Sula Bacacay, Albay. The findings aim to inform community and institutional actions for a more sustainable fishery sector. The analysis of fishery participants revealed a profile

dominated by middle-aged individuals, with a significant role played by women. The fishery provides income for both single and family households, with a diversity of professions beyond fish cage ownership. However, a considerable portion of participants fall within the low-income bracket. Regarding fish cages, residents expressed concerns about potential negative environmental impacts on water quality and channel navigation. The data suggested a lack of clear understanding about the overall economic benefits for the community and limited resident involvement in the fish cage program.

Based on these findings, the following recommendations are proposed:

1. Develop training programs to enhance skills in sustainable fishing practices and fishery management.
2. Increase community participation in the fish cage program through co-management structures or advisory committees.
3. Implement transparent communication channels to share information about fish cage operations, environmental impacts, and economic benefits.

By implementing these recommendations, Sula Channel can strive for a fishery sector that is economically viable, environmentally sustainable, and socially responsible. This will require collaboration among fishery participants, community leaders, and government agencies. Overall, it suggests that while fish cages provide some economic benefits through employment, there are concerns about their environmental impact and a lack of perceived community involvement or benefit. Further studies are needed to understand the reasons behind these perceptions and explore improvement opportunities for the fish cage program.

Recommendations

On Fishery Participants

1. Skills Development: Design and implement training programs to enhance the skills of fishery participants, particularly in areas like sustainable fishing practices, aquaculture management (if applicable), and basic business management for those involved in selling or processing fish. This could improve incomes and overall fishery management.
2. Financial Inclusion: Explore options to provide microloans or financial support programs for fishery participants, especially low-income earners. This could empower them to invest in equipment, diversify their activities, or potentially even start small-scale fish cage operations.
3. Education and Outreach: Develop educational programs that inform residents about the fishery sector, including the importance of sustainable practices, the role of fish cages (if applicable), and responsible resource management. This could foster a sense of ownership and encourage community involvement.

Regarding Fish Cage Management:

1. Environmental Impact Assessment: Conduct a comprehensive environmental impact assessment (EIA) to objectively evaluate the true effects of fish cages on water quality, flow, and resource availability. This will provide a scientific basis for decision-making and potential mitigation strategies.
2. Community Involvement: Explore ways to increase community participation in the fish cage program. This could involve co-management structures, profit-sharing models, or establishing advisory committees. Residents' voices and knowledge can contribute to a more sustainable and socially responsible program.
3. Transparency and Communication: Improve transparency and communication regarding the fish cage program. Regularly share information about fish cage management practices, economic benefits

(employment, taxes generated), and potential environmental impacts with the community. Address resident concerns and involve them in discussions about the program's future.

Additional Considerations:

1. Gender Equity: Investigate the specific roles and challenges faced by women in the fishery sector. Design programs and support systems that address their needs and promote gender equity within the fishery.
2. Alternative Livelihoods: Explore and develop alternative livelihood options for those who might be negatively impacted by the fish cage program or who seek diversification. This could involve promoting eco-tourism, value-added fish processing, or handicraft production using sustainable materials.
3. Monitoring and Evaluation: Establish a system for ongoing monitoring and evaluation of the fish cage program. This will allow for adjustments based on data, ensuring the program remains environmentally sound, economically viable, and socially responsible.

By implementing these comprehensive recommendations, the fishery sector in Sula Channel can become more sustainable, equitable, and beneficial for the community as a whole. It is important to involve stakeholders, including fishery participants, community leaders, and environmental experts, throughout the decision-making process.

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