

# Socio-economic status and environmental problems affecting the fishermen along the river tributaries of Dagupan City

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**Abstract** – *This study was conducted to determine the socio-economic status of the fishermen along the river tributaries of Dagupan City and to study the environment problems affecting the fishermen along the river tributaries of Dagupan City. This study used a mixed method research design and utilized a survey questionnaire to gather response from 60 fishers selected through proportionate sampling. The fishermen along the tributaries of Dagupan City are mostly male, young adult with family of their own, attended primary education, and belong to big family size. All respondents owned houses made only of light materials. Shrimps and crabs were the most frequently caught species now compared to many small pelagic fishes before, when there were no aquaculture structures like fish pens and cages. Fishermen were limited to the ownership of passive fishing gears like gill nets, skylab, skyblue, and liftnet. Fishpen or cage structures were owned by big businessmen while the fishers served only as caretakers. The respondents are worried on the decrease of fish catch. It is recommended that the government of the City of Dagupan should continue its program in demolishing pen and cage structures to free the rivers from pollution of feed inputs. Management and economic measures should be considered in order to gain significant effect on income of the fishermen. In designing management systems which have income improvement as a goal, appropriate implementation, monitoring and evaluation initiatives should be conducted and taken cared of for sustainable income improvement of farmers in the community of Dagupan and, perhaps, wealth distribution.*

**Keywords** – *Socio-economic profile; environmental problems; fishermen; coastal barangays; Dagupan City*

## INTRODUCTION

The Philippines is endowed with substantial water resources comprising of 421 principal rivers, 18 major river basins and 72 lakes [1]. This is in addition to the country's coastline of 36,289 kilometers [2]. The abundance of the country on fresh water resources is an opportunity for fish farming. In fact, the fishing industry contributed 1.5 percent to the country's gross domestic product in 2015 [3].

As almost half of the country's population live in farming or fishing areas, rural fish farming is common. This is done by small scale farming households using low-cost production technology appropriate for their resource capability. And generally, fishermen are low in terms of socioeconomic aspect [4] [5] [2]. This challenge is the result of expanding fishing population, lack of alternative options, and poverty [6]. Other problems include unsustainable fisheries [7], destructive fishing

practices [8] [9] [6], bad condition of water resources [4] and decline of fish catch [10] [4]. When it comes to environment problem, studies show same result about fish kill in cages and pens in Bolinao, Pangasinan [11] and Antique province [4]. To date little is known about other socio-economic status and the environmental problems encountered by the fishermen along the river tributaries of Dagupan City, Pangasinan aside from fish kill. The present survey aimed to fill this gap by determining the socio economic condition of fishermen in Dagupan City in terms of their personal profile, type of house and fishing gear owned. Another objective is about the problem on environment that affects the livelihood of these fishermen.

## MATERIALS AND METHODS

The mixed-method research design was used in this study. This method focuses on collecting, analyzing and

mixing both quantitative and quantitative data [12]. It allows researchers to look to many approaches to collecting and analyzing data rather than subscribing to only one way. Data from the respondent fishermen were gathered using survey questionnaire and interview guide. The survey questionnaire consist of three parts in order to get information like their profile, their fishing gear, type of house and environmental problems they have encountered. The questionnaire was first pre-tested before it was finally administered to fishermen. The researcher went to the different barangays under study and personally asked respondents all questions indicated in the questionnaire. The researcher translated the contents of the questionnaire in Pangasinan or Ilocano dialects while asking respondents. Respondents were also asked questions regarding their socio-economic status and environmental problems that are relevant to their fishing activities.

The answers of the respondents indicated in the questionnaire were carefully tabulated, analyzed and interpreted to arrive at conclusions and implications. The frequency counts (f) and relative frequency or percentages (%) were computed and used for the descriptive presentations of the findings. Average weighted value or weighted mean was used to determine the level of perception on the situations presented to the respondents. On the degree of seriousness of the problems/environmental issues encountered by the respondents in their fishing activity, the following scale was used: 5, very serious (scale from 4.21-5.00); 4, serious (3.41-4.20); 3, moderately serious (2.61-3.40), 2, slightly serious (1.81-2.60); 1, not serious (1.00-1.80).

There were 60 fishermen who served as respondents and they are living along the coastal barangays of Dagupan City. The city has vast brackishwater areas for fish farming. There are 220 motorized and 88 non-motorized boats used by 680 fishermen in different coastal barangays. A total of 60 fishermen were interviewed to represent total sample based on statistical formula and from the data provided by the Office of the Provincial Agriculturist on the number of fishermen undertaking fishing activity in the coastal waters of Dagupan City in the year 2010. Since, total number of fishermen in the barangays under study are not the same, random and stratified sampling procedure was done to determine the size of sample respondents per barangay. Hence, 18 respondents were drawn from barangay Salapingao, 14 from Talaib-Luca, 16 from Tokok-Luca, and 12 from Pugaro, for a total of 60 respondents.

Barangay Pugaro-Suit is located in the northern part of Dagupan City with a total land area of 128 ha. It is

bounded by Lingayen Gulf at the northern portion, by barangay Lomboy at the south, by Bonuan Gueset at the east, and barangay Salapingao at the west. The barangay is only 3 kilometers from the central business district. Salapingao is an island barangay of Dagupan City. It is bounded by Bonuan Gueset at the east, Lomboy at the southwest, Calmay and Caraelat the southeast, Binmaley at the west and Pugaro at the north. The total land area is 54 ha. The barangay is 2 to 5 kilometers from the city hall building and is about 15 to 25 minutes ride by motorboat. Tokok is also one among the island barangays of Dagupan City. It is bounded by Caraelat the southeast, Calmay at the south, Pantal at the east, and Lomboy at the north. It has a total land area of 46 ha. The barangay is about 2 kilometers from the city and is about 15 to 20 minutes ride by motorboat. Talaib is located in the southern portion of the city. It is adjacent to barangay Tokok and with a total land area of 157 ha. The barangay is 1.5 km from the central business district and is about 5-10 minutes by boat.

## RESULTS AND DISCUSSION

Table 1. Socio-demographic profile of respondents (N=60)

	Profile	f	%
Gender	Male	40	66.67
	Female	20	33.33
Age	18-20 years old	5	8.33
	21-30 years old	19	31.67
	31-40 years old	14	23.33
	41-50 years old	10	16.67
	51-60 years old	10	16.67
	61 years old and above	2	3.33
Civil Status	Single	15	25.00
	Married	45	75.00
Religion	Roman Catholic	56	93.33
	Iglesia ni Cristo	4	6.67
Number of Household Members	1-5	27	45.00
	6-10	32	53.33
	11 and above	1	1.67
Educational Attainment	Elementary Level	24	40.00
	Elementary Graduate	4	6.67
	High School Level	10	16.66
	High School Graduate	11	18.33
	College Level	7	11.67
Monthly Household Income	Php 3,001-6,000	4	6.67
	Php 1,001-3,000	54	90.00
	Php 1,000 and below	2	3.33

Table 1 presents the profile of the respondents in terms of gender, age, civil status, religion, number of household members, and educational attainment. Majority of the respondents were males (66.7%). It was

interesting to note, however, that females took an active part in fishing activity. Nineteen of the respondents (31.67%) belonged to the age bracket of 21-30 years old, followed by 31-40 years old (23.33%), 41-50 and 51-60 (both 16.67%), 18-20 years old (8.33%), and above 60 years old (3.33%).

In terms of civil status, 75% were married and 25% were single. More than half of the respondents (53.33%) have 6-10 household members. Forty-five percent have 1-5 household members and 1.67% had 11 and above.

Most were Roman Catholics (93.33%) and the rest belonged to the Iglesia ni Cristo denomination. In terms of educational attainment, 40% were elementary undergraduates whereas 16.66% and 18.33% were high school undergraduates and high school graduates, respectively. Eleven of the respondents entered college level but only four (6.67%) obtained their college diploma. Married respondents said that they were not able to continue schooling and get higher education because of their responsibility to their children. They prioritized food and education of their children. For unmarried respondents who did not make it to college, they found fishing more important because they were earning income and they are ashamed of going to school again because of their age. However, most of the respondents said that if they can turn back the time, they will attend school and finish a degree in order to get better job and income.

Majority or 90% of the respondents have monthly household incomes of PhP 1,001 to PhP 3,000 which is below the monthly wage prescribed for a regular worker. Two of the respondents (3.33%) were even receiving less than PhP 1,000 per month. Only four of them (6.67%) received monthly incomes from PhP 3,001-6,000. The respondents said that the income from fishing activity is just enough to get their families through the day, and to cover the cost of their children's education. Some feared of not sending their children to high school or college in the future.

Similar results were found in income levels, health, and education in coastal barangays in Danajon Bank in Bohol [13] [2] and in other developing countries [13]. The socio-economic conditions in the coastal areas are below national standards, despite the considerable coastal natural resource base.

All of the respondents owned houses (Table 2). Twenty-three (38.33%) of the respondents owned a type of house with a combination of concrete, wood, and nipa, 26.67% have wooden houses, 23.33% have concrete houses, and 11.67% have nipa houses. Those with houses made of concrete said that strong house is needed to

survive typhoon and flood. Since the respondents' houses are located in island barangays of Dagupan City, their area is flood prone. The respondents with houses made of wood, nipa and combination also wanted to have concrete houses someday. This goal will still depend on their income from fishing or assistance from their children who will become workers in the future.

**Table 2. Type of houses of the respondents**

Type of House	Frequency	Percentage
Concrete	14	23.33
Wooden	16	26.67
Nipa (Palm tree leaves)	7	11.67
Combination (Concrete/Wooden/Nipa)	23	38.33
<b>Total</b>	<b>60</b>	<b>100</b>

According to the respondents, marine animals frequently caught during their fishing activity were shrimp and crabs. Mullet, siganids, and other small pelagics were no longer caught in the present time. The milkfish or bangus cultured in four to five months is an added income for those with net enclosure or fishpen in which these respondents served as caretakers of big businessmen or capitalists. Most of the caught and cultured are sold in the market. Money earned from their sales is used to buy the basic necessities like rice, coffee, and other items needed in their daily living.

A total of 177 fishing gears/structures were owned by the respondents tabulated in Table 3. The use of gill net or termed in local dialect as "tabal" comprised 36.72% of the total fishing gears owned and managed by the respondents, followed by fishpen or cages (27.68%), skylab (19.78%), skyblue (11.87%) and lift net (3.95%).

**Table 3. List of fishing gears and fishing structure owned and/or managed by the respondents**

Name of Fishing Gear/Structure	Frequency	Percentage
Fishpen/Cages	49	27.68
Gill Net	65	36.72
Skylab	35	19.78
Skyblue	21	11.87
Lift Net	7	3.95
<b>Total</b>	<b>177</b>	<b>100</b>

All these fishing gears/structures observed along the river tributaries are considered passive fishing gears. These are characterized by the absence of gear movement in the pursuit of target species during fishing activity.

Table 4. Seriousness of the problems and environmental issues encountered by the respondents

Problems/Issues	Weighted Mean	Descriptive Rating
Declining Fish Catch	3.20	MS
Deteriorating Water Quality	2.53	MS
Fish Caught Before are no Longer Caught Now	2.46	SS
Proliferation of Fishpen and cages	2.45	SSS
Occurrence of Fish Kill	2.27	SS
Run-off of Agricultural Waste	2.10	SS
Run-off of Industrial Waste	2.00	SS
Siltation	2.00	SS
Improper Garbage Disposal	1.80	Ss
<b>Overall mean</b>	<b>2.31</b>	<b>SS</b>

Legend: MS – moderately serious, SS – slightly serious

When it comes to environmental issues, there were problems and environmental issues encountered by the respondents in their day to day fishing activities. These fishermen were asked to rank the degree of seriousness of each of these problems and environmental issues as shown in Table 4.

Declining fish catch and deteriorating water quality were perceived by the respondents as among the most serious problems and environmental issues that greatly affect them. This phenomenon is also experienced in Bohol province [2], General Santos City [15], and the world [10].

During data gathering, the respondents mentioned that there were many abundant species before but no longer caught probably as a result of poor water quality. This problem ranked third among the issues with average weighted mean of 2.46, rated as “slightly serious”. Another, proliferation of fishpen and cages is ranked four among the problems. It had a mean of 2.45 with a descriptive equivalent of “slightly serious.” Fish pen or cages greatly contributed to the deterioration of water quality because of the uncontrolled use of commercial feeds for milkfish. Uneaten or excess feeds accumulate at the bottom and contribute to the deterioration of water quality [11],[2],[16].

The occurrence of fish kill was also rated “slightly serious” with weighted mean of 2.27. On May 16, 2002, a fish kill episode happened in Dagupan City resulting to the death of more than 500,000 pieces of bangus valued at PhP5 million (taken from the news clippings of SEAFDEC Library, Iloilo). According to Ronaldo Cayabyab, FARMC Chairperson, the fish kill was spurred by the continuing deterioration of the quality of water in rivers that were still cluttered with illegal fishpens. Fish kill was observed in the rivers in Sitio

Tocok and Talaib, in barangays Calmay and Carael as well as in barangay Lucao. Massive fish kills were likewise experienced in Bolinao in three consecutive days of February 2002 that caused death of bangus worth over PhP400 million [17].

The intermediate or root cause of the 2002 fish kill in Bolinao could be traced to the proliferation and intensification of finfish farming in the coastal waters of Bolinao and Anda (Pangasinan), activities that went well beyond the carrying capacity of the near shore environment [17]. Relying on acquired data and best information available then, researchers of the Marine Science Institute (UP Diliman) had proposed an optimum number of structures (pens and cages) that should be allowed in the contiguous waters of Bolinao and Anda and the sites where these structures should be located. The number of structures were not to exceed 500, and areas that were naturally constricted (e.g., Caquiputan Channel) were to be left open. Concurrence by the local executives of Bolinao was manifested by the adoption of these recommendations into the municipality’s coastal management plan and the passage of a municipal ordinance in 1999. Unfortunately, the ordinance was not adhered to. By the end of 2001, just months prior to the massive fish kill, several pens and cages had been built, with most of these stocked well beyond the optimum stocking density [16]. A greater number of cultured fish meant more feeds used and wasted, especially as cage and pen operators also employed cheaper (but low quality) feeds. The coastal waters of Bolinao turned eutrophic (nutrient rich and enhanced the bloom of phytoplankton), and the proliferation of structures reduced flushing rates of the coastal waters.

Other problems like run-off of agricultural and industrial wastes, siltation and improper garbage disposal were all rated “slightly serious.” Over-all -mean of the problems encountered was 2.31, collectively rated as “slightly serious.”

#### CONCLUSION AND RECOMMENDATION

The fishermen along the tributaries of Dagupan City are mostly male, young adult with family of their own, attended primary education, and belong to big family size. They struggle to support their families with their meagre income. Their houses are combination of strong and light materials while their fishing gear consists of gill net, fishpen or cages and skylab. The respondents are worried on less fish catch and gradual disappearing of some species of fish. Some fish culture practices in the river were inappropriate just like the construction of fish

pens and fish cages that allow excess commercial feeds to accumulate which contributes to the deteriorating quality of water. This environmental problem is a major concern of fishermen since it causes a lot of trouble. Polluted water could lead to fish mortality and reduced quality of fish [2], [15].

In order to address the problems experienced by the respondents, there are mechanisms that could be employed. These are understanding of the socioeconomic factors that affect the decisions of fishermen to continue or discontinue fishing and study the operational behaviour of fishermen [15], establish a protected area [4], [6], improved fisheries policy improvement by the local government [8].

It is recommended that the government of the City of Dagupan should continue its program in demolishing fishpen and cage structures to free the rivers from pollution of feed inputs. This will allow the river to recuperate to its previous state. This will likewise allow other fish species that were displaced to come back to their habitat. Managing fisheries does not end with the implementation of local policies of Dagupan City that directly influence fishing activity. It is also important to involve the fishermen, middlemen, consumers and other stakeholders like the local government, government scientific and fishery agencies, and fishery conservation organizations in fisheries management. In this manner, every group will be aware of their role and contribution to the recovery and conservation of river tributaries in Dagupan City and fishery management.

There is also a need to improve the fishery science, and monitoring and management capacities of government agencies in-charge of fishery management. A long-term analysis of fish farming in the country is essential considering the socio-economic importance of fisheries and fishing activities to many Filipinos. It is argued that many management measures are likely to have a significant effect on wealth but little, if any, on income. In designing management systems which have income improvement as a goal, care therefore needs to be taken if a sustainable improvement in incomes is to be achieved rather than a, perhaps unintended, wealth redistribution [19].

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