

Socio-Economic and Environmental Impact of the “No Fish Pen / Fish Cages Policy” As Perceived by Fishermen Along Lingayen-Binmaley- Dagupan City River System, Philippines

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Abstract – The program *My River: I love, I Enrich* of the provincial government of Pangasinan, Philippines is dedicated to the conservation of our river system, improvement of our environment, maintenance of ecological balance and as a risk mitigating measures against climate changes. Corollary to this program is the implementation the policy of no fish pen/ fish cages along the river system. This study was an evaluation on the perception of the fishermen who were affected socially, economically and their perception on the new policy's effects to the environment, as well as the problems they faced. All respondents agreed that the policy of the no fish cages/fish pen along the river system had brought environmental impact. The hazardous substances in the water that posing health risk was minimized, brought by the new policy. Because the carrying capacity of the water had improved, this result to increase in the size of fish catch and thus commanding higher price. The fishing habitat is improved increasing the population of endemic fishes The level of water turbidity had improved, the destruction of laying ground for fish is minimized, pathogenic organisms were reduced. In terms of water quality of the river system such as salinity, DO, pH, turbidity, PO₄ and NO₃ content was perceived by the respondents to be in suitable range. The removal of the fish cages/fish pen also caused the water to be free from obstructions making navigation on the river easier, navigational hazards and flash flood were reduced which lead to the improvement of water flow, reduction of water pollution, of siltation, periodic fish kill and algal bloom. The main problem encountered by the respondents in terms of their fishing operations was the overflowing of water due to typhoon and the insufficient technical support from the government. Irregular supply and exorbitant price of feeds, harsh weather conditions, the occurrence of periodic fish kill due to water pollution caused by industrial and sanitary waste and construction of shoreline protection measures were also their problems. Overcrowding of fish cages was cited as reason for difficult of navigation due to narrowing of water ways. The perception of the respondents in terms of their socio-economic and environmental impact on the implementation of the no fish pen/fish cages along the river system policy has significant differences on their profile 'type of fisherman' profile.

Keywords – Fish cage policy, No fish pen, Pangasinan aquaculture, Socio-economic-environmental impact

INTRODUCTION

Pangasinan, a province of Region I in the northern part of the Philippines is blessed with many rivers, lakes and shorelines.. Because of these bodies of water, aquaculture was one of the biggest economic contributors to the province. Dagupan City as claimed to be the Bangus Capital of the country, Binmaley as the Fishbowl of the North is a significant mark on the greatest contribution of aquaculture to our economy.

Majority of the town's people especially in Binmaley are fishermen/ fish farmers where most of the locals derived their livelihood from the river. According to the Food and Agriculture Organization of the United Nations, Pangasinan is one of the five major provinces for aquaculture production in 2002.

Fishpen and fish cages are the major structures used in inland waters (Araullo, 2011). Its sizes vary dependent on the capability of the operator to finance such. Ecological impact is greatest. Water pollution is

brought by excessive feeding brought by overstocking. It also depletes dissolve oxygen in the water as beneficial algae die-off.

Beneficial, as fishpen and cage operators are provided with livelihood, employment and food, Araullo (2001) observed that in terms of socio-economic impact, aquaculture structures on lakes pose hazards and barriers by fishermen and lake navigators.

Israel (2008) reviewed the culture status on fishpen and fishcage in Laguna de Bay and the problem this stuated posed with its continued practice. Findings suggest that the practice significantly contributed to the fish production and helped supply cheaper fish in Metro Manila. The practice contributed significantly in terms of employment, income and government revenue generation. Amidst the positive socio-economic effect, numerous environmental problems are faced with the said practice.

In his review, Price, et.al. (2015) gathered published papers after year 2000 in peer-reviewed journals with citations and published in English. Price (2015) and his team look forward that to achieve economically and ecologically sustainable marine aquaculture, optimal siting and best management practices should be put in place. Price, et.al hold that modern operating conditions have minimized impacts of fishfarms on marine water quality on individual levels. With better management, they concluded that dissolved oxygen and turbidity have been largely eliminated.

Goudey, et. al. (2001) observed that the most severe impact has been associated with intensively large operations in areas with inadequate water circulation. Nearby water and seabed are negatively affected with faeces production and uneaten feeds of finfish.

Jahani, et.al. (2012) investigated the probable effects of fish cage culture on benthic communities as a pollution and stress indicator and to evaluate the biotic health condition using BOPA index in the Persian Gulf. Their findings suggest that the under cage station was more polluted than the control station. BOPA index is used to establish the ecological quality status of any body of water.

The analysis further indicates that while fishpen and fishcage culture is economically and socially important, it is facing numerous problems foremost of which are environmental problems, the social problem of poaching, the institutional problem of lack of overall government support, and the economic problem of lack of access to cheap capital Israel (2008).

The most often mentioned problems were: the high prices of production inputs and poor durability of construction materials; occurrence of algal blooms, fish kills, water hyacinths and water pollution; incidence of poaching and displacement of municipal fishermen; overcrowding of fishpens and existence of illegal fishpens; insufficient technical support from the government; and fortuitous events particularly floods and typhoons.

A study which looked into the numerous problems affecting Laguna de Bay in general and on fisheries and aquaculture in particular is Lasco et al.(2005). This study, together with its component study by Palma et al. (2005), Philippine Journal of Development (2008)emphasized that although fishpen and fish cage culture in the lake has helped increase fish production, it has also significantly reduced the area for capture fisheries. As a result, social conflicts between aquaculture operators and sustenance fishermen in the lake have occurred. This study also mentioned that overall fisheries in the lake have declined over the years in terms of productivity and species composition as a result of human, industrial, and environmental factors.

Israel (2008) in his paper reviews the status of fish pen and fish cage culture in Laguna de Bay, with emphasis on its economic importance and the relative severity of the problems affecting its continued practice. The paper aimed to provide an economic analysis that will help decision makers, stakeholders, and other interested parties make in-formed decisions and opinions on the conduct of the activity. Sources of data are the survey of fish pen and fish cage operators and their operations and key informant interviews conducted in 2007, records of government institutions involved in aquaculture in Laguna de Bay, and relevant published literature.

The analysis shows that fish pen and fish cage culture in Laguna de Bay has important economic and social contributions to the lake municipalities and to the country. In particular, it significantly contributes to fish production, income, employment, and generation of public revenues. Furthermore, it helps supply cheaper fish to Metro Manila where a large segment of urban poor population resides. Because of these, caution must be exercised before any decision related to its reduction or termination can be made.

The province was shocked with news which seemed to curse the fish industry. In 2002 another fish kill, smaller in scale, but still devastating for the town residents, would hit Bolinao two months later. Experts

said that the proliferation of fish pens and cages has led to depleted oxygen concentration and the rise in harmful algal bloom in the host waters. This 2018 some 172 fish pens and cages in Pangasinan, were hit by fish kills, incurring PHP107 million in losses. The culprit was caused by the high temperature during the day and then the sudden rain in the afternoon. This change in temperature decreased the dissolved oxygen in the water, resulting in fish kill, according to authority. Water pollution was another factor.

Alarmed with the possible danger and threat brought by pollution due to the aquaculture practices in the province, the Provincial Government Campaign has launched its "ILOG KO, AROEN KO, BILAYEN KO" program, to conduct a massive river cleaning operation along these rivers. Governor Amado T. Espino Jr. tasked the Provincial Disaster Coordinating Council (PDCC) to undertake a massive river clean up. Honorable Mayor Lorenzo Cerezo of Binmaley supported the initiative of the Governor and his administration removed fish pens and fish cages, mussel farms, bamboo poles, etc. in all river system of Binmaley and also in Lingayen and Dagupan City followed suit to the program. This program aims to return the natural flow of the water and to have the river system have enough breathing time to avoid fish kills, red tide, and also flashfloods brought about by climate changes and to have the rivers timing with fish again.

OBJECTIVES OF THE STUDY

This study aimed to find out the perception of the fishermen who were greatly affected with the implementation of the no fish pen/fish cages policy along the river system of Dagupan City, Binmaley and Lingayen in the province of Pangasinan. To determine their perception to what extent they are greatly benefited socially, economically and how the environment is protected at the same time. Evaluation ensures that the program contribute to goals and objectives as they are planned. Result of the study will served as a basis for decision making in improving the effectiveness of such program. The result of the study will become basis to encourage fisher folk's participation in other environmental program to motivate them to adapt the policy and influence them to actively participate in other future programs. The findings of this study could be significant to government organizations, community leaders, who are involved in the conduct of the program. The result could be used as the basis for planning other programs.

Finally, the result of the study can be used as a gauge of the extent to which the program is intended. It is a gauge to find out how the fishermen are really economically benefited and the program is a measure to insure to mitigate risk reduction brought by climate change.

MATERIALS AND METHODS

The researcher made use of the descriptive method to achieve the purpose this method of research was directed towards ascertaining the conditions that permits respondents in answering the questionnaire in the different barangays. Random sampling was utilized.

Research Locale

The study was conducted in the different barangay of Dagupan City, Binmaley and Lingayen, Pangasinan. Barangays were identified which are near the river system flowing in the three research locales: one in the city and two municipal towns of Pangasinan.

Research Respondents

Target respondents were residents of the different barangays in Dagupan City, Binmaley and Lingayen. The study involved four different stakeholders who reside in the three towns who live near the river tributaries of Agno River traversing the province of Pangasinan. The stakeholders considered were, the fish pond owner only, both fish pond owner and fish cages/fish pen owner, fish cages/fish pen owner and small scale fishermen. There were a total of 376 respondents in the study.

Data Gathering Instruments

This study used a checklist questionnaire as the data gathering instrument. It consisted of four parts: (1) respondents profile; (2) their perception on the policy in terms of socio-economic impact and environmental impact; and (3) the problems encountered by the respondents in the implementation of the policy. The questionnaire was validated by authorities and expert in aquaculture. There were four selected experts who are faculty members of PSU College of Fishery in Binmaley, Pangasinan. Also, a statistician was consulted prior to the giving of the questionnaire to the respondents. Necessary revisions were made by the researchers.

Statistical Treatment of Data

The profile of the respondents in terms of age, gender, educational attainment, family income, other

sources of income, and numbers of family members were tabulated and presented using the frequency counts, ranks, percentages and averages. The perception in terms of environmental impact and socio-economic impact was determined 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 range 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 – 1.80 – very strongly disagree. Average Weighted Mean was used to describe the perception of the respondents. In terms of the problems

encountered by the fishermen, frequency count and ranking was used. To test the significance differences the two- way analysis of variance was utilized.

RESULTS AND DISCUSSION

The respondents of the study involved four types of fishermen-- fish pond owner, both fish pond and fish cages/fish pen owners, fish cages/fish pen owners and small scale fishermen. Respondents were randomly selected from the different barangays of the three identified municipalities of Binmaley and Lingayen and Dagupan City. Only those residing near the bodies of the river system of the three areas served as respondents.

Table 1. Profile of the Respondents

Profile	Sub-category	Frequency	Percentage
Barangay /Area	Bonuan	20	5.3
	Lomboy	36	9.6
	Mamalingling	44	11.7
	Binmaley	20	5.3
	Pantal	80	21.3
	Pantal	17	4.5
	Pugaro	70	18.6
	Salapingao	70	18.6
	Lingayen	19	5.1
	Total	376	100
Age Range	15 – 25	10	4.65
	26 – 35	30	14
	36 – 45	68	31.6
	46 – 55	78	36.3
	56 – 64	21	9.77
	65 – 75	7	3.26
	76 and above	1	0.47
	Total	215	100
Sex	Male	370	98.4
	Female	6	1.6
	Total	376	100
Civil Status	Single	36	9.6
	Married	334	88.8
	Widow / Widower	5	1.3
	Separated	1	3
	Total	376	100
Number of Children	0	43	11.4
	1 – 4 children	218	58
	5 – 8 children	104	27.7
	9 – 12 children	11	2.9
	Total	376	100
Classification of	Fish Cage / Pen Owner	108	28.7

Respondents	Fish Pond Owner	159	42.3
	Both 1 and 2	29	7.7
	Small scale fisherman	80	21.3
	Total	376	100
Highest Educational Attainment	Elementary Graduate	80	21.3
	High School Graduate	212	56.4
	College Graduate	54	14.4
	Vocational	30	8
	Total	375	100
Income Status	Below ₱5,000	94	25
	₱5,000 - ₱10,000	80	21.3
	₱10,001 - ₱15,000	87	23.1
	₱15,001 - ₱20,000	91	24.2
	₱20,001 and above	24	6.4
	Total	376	100
Length of Experience in Fish Farming	Less than 1 year	51	13.6
	1 – 5 years	125	33.2
	6 – 10 years	64	17
	11 – 15 years	27	7.2
	16 – 20 years	22	5.9
	More than 20 years	87	23.1
	Total	376	100
Other Sources of Income	None	76	20.2
	Salary from Profession	16	4.3
	Operating Business beside fishing	61	16.2
	Owens Tricycle/Jeepney for Rent	43	11.4
	Pension	16	4.3
	Lending	6	1.6
	Buying and Selling	136	36.2
	Others	22	5.9
	Total	376	100

Most of the respondents varied in their ages. Of the 376 respondents, majority are Middle Ages ranging from 36 to 55 years old. Only few old men were engaged in the fishing industry while four were adolescents within the age range 15-25 years old. There was a very old respondent with the age of 83 years. For the profile sex, most of the respondents are male with a total of 370 out of 376; only six were females. This suggests that fishing is dominated by men in Pangasinan fish industry. Majority of the respondents with a total of 334 or 88.8 % were married, 36 or 9.6% were single, 5 or 1.3% were widow or widower and 1 or .3% was separated. Most of the respondents were all with their own family. For their type of occupation in the fish industry, 159 or 42.3% were owners of a fish pond, 108 or 28.7% were fish cage/fish pen owners, 80 or 21.3% were small scale fishermen and 29 or 7.7%

were both owners of fish pond and at the same time owner of fish cages/fish pen on the river system.

Majority of the respondents were high school graduates with a total of 212 or 56.4%; 80 or 21.3% were elementary graduates, 54 or 14.4% were college graduates, while 30 or 8% were vocational graduates. This indicates that fishing is a lucrative business venture and others have considered it a good source of income rather than having none at all. Most of the respondents i.e. 218 or 58% have children between 1-4, 104 or 27.7% have bigger number of children with 5-8, while 43 or 11.4 % have no child probably this are the single respondents while 11 or 2.9% of the respondents have 9-12 children probably are the respondents who are very old and have grandchildren. Ninety-two (92) or 24.5% of the respondents have monthly income of below P5000.00 but 24.2% or 91 of the respondents earned monthly income of between P15000-20,000,

third in rank are 87 or 23.1% earned between P10,000-15,000 while followed by 24 or 6.4% earned P20,000 and above. Probably these respondents are the owners of both fish cages/fish pen and fish pond owners while those with the lowest income earned are the small scale fishermen. Two of the respondents did not disclosed their income.

Majority of the respondents with a total of 122 or 32.4% have 5 years' experience as fishermen either as fish pond owner and both fish cages/fish pen owner, while 87 or 23.1% have been engaged for more than twenty years which indicate that fishing is a good venture, 64 or 32.4% of the respondents have less than a year experience 27 or 7.2% have been engage in fishing for 11 to 15 years while 22 or 5.9% were engage in fishing for 16-20 years. Three did not disclose their length of experience as fishermen.

The respondents have also other source of income beside engage in the management of fish pond or fish cages/fish pens. 136 or 36.2% of the respondents are engage in buy and sell, while 76 or 22.2% have indicated they have no other source of income meaning they are only dependent on the fishing activity. 61 or 16.25 have other operating business followed by 43 or 11.45 owns tricycle or jeepney for rent as other source of income. While other 16 or 4.3% received salary from the exercise of their profession while old respondents are pensioner. Very few 6 or 1.6% are engage in lending money.

Table 2. Impact of Policy as Perceived by the Different Fishermen on Various Factors

Factor	Average Weighted Mean	Descriptive Meaning
Socio-Economic Impact	3	Moderately Agree
Environmental Impact	3.72	Strongly Agree
Overall Average Weighted Mean	3.36	Moderately Agree

The respondents rated the socio-economic impact of the policy as "moderately agree", while the environmental impact as "strongly agree".

In terms of Socio-Economic impact the respondents perceived that the new policy "No fish pen/fish cages on the River system," All respondents claimed that they were able to save more money due to better income. Although most admitted that fish cage

culture was highly profitable and productive. But because of the implementation of the policy, the demand for fish fry and fingerlings decreased. The respondents also claimed that because of increased / better income, the respondents now enjoy the economic benefit of sending their children to schools, avail of loans and now have better capability to pay.

Since, there is no more fish cages/fish pen to operate, fish cages/fish pen owners do not need to employ extra labor to work. The money paid for extra labor instead is used to buy more appliances to use at home. The respondents also agreed that there is an increase in their monthly income especially the fish pond owners and the price of feeds used and fish pond building materials are now affordable for them. With the increase of their income, they were able to improve their house dwellings.

The respondents considered the program beneficial for the community and the policy of no fish pen/fish cages is better especially for the fish pond owners; although, there is a claim of displacement of fishermen on the part of fish cages/fish pen owner only.

In terms of environmental impact of the policy, the overall weighted mean perception of the fishermen of 3.72 indicates that the respondents have 'moderately agreed' on the positive effects of the policy.

They agreed that with the removal of the fish cages/fish pen along the river system had minimized the hazardous substances in the water that poses danger to health of the people. It also follows that the carrying capacity of the bodies of water had improved, making the fish increase in size or they grow larger/bigger and then allows the fish price to increase. This means that because of higher quality of the fish size it commands higher price. The program is considered beneficial to the community because of the removal of the fish cages/fish pens the water turbidity is improved meaning because of no more feeds that decay on the water and this allows the laying grounds for fish are minimized, the fishing habitat is improved and lead to an increase of the endemic water fish. Because of no more commercial feeds that caused water pollution the problem of oxygen depletion of water is also reduced. Water quality had been improved in terms of salinity, DO, pH, turbidity, and pathogenic organisms were reduced.

Because of the removal of the fish cages/fish pens that causes obstruction, water transport system is now able to navigate the river, thus reducing the navigational hazards. Water pollution is minimized

thus improving the water quality and resulted to increase of fish catch and shell fish production.

Without the fish cages/fish pen, there are no more obstruction, allowing water to flow freely, thus reducing flash floods, and siltation caused by commercial feeds is reduced, periodic fish kill and algal bloom were also reduced. All in the entire program has its beneficial impact to our environment especially the aquatic ecosystem. With the implementation of the program by the provincial government and local government units of Lingayen, Binmaley and the City

of Dagupan, the fish production had improved and provided a higher economic benefits and provides aesthetic consideration. With the removal of these cages and pens, the clean and clear river system can be utilized as an avenue for river cruise as a part of the tourism industry, thus increasing appreciation and awareness on the natural environment and with good proper management and utilization of the river system will enhance the socio-economic status of the fishermen as well as the community.

Table 3. Problems Encountered by the Different Fishermen in Relation to the Policy

Factor	Frequency	Rank
1. Over-crowding of cages	217	10.5
2. Poaching	190	20.5
3. Overflowing of water due to typhoon	289	1
4. Displacement of fisherman	167	26
5. Difficulty in navigation due to narrowing of waterways	240	6
6. Clogging of water hyacinths	191	19
7. Insufficient technical support from government	270	2
8. Irregular supply of feeds	266	3
9. Exorbitant price of feeds	254	4
10. Unavailability of credit for fish pond construction	184	23
11. Algal bloom	165	27.5
12. Periodic fish kills	228	7
13. Immediate releasing of water from fish ponds with pesticides	189	22
14. Limited durability of fish pond building materials	202	13.5
15. Existence of illegal fish pens	202	13.5
16. Harsh weather conditions	244	5
17. Fish pilferage	165	27.5
18. Equity in terms of access o resources	192	18
19. Water pollution due to industrial and sanitary wastes	220	8
20. Water pollution from agri-fisheries	201	15.5
21. Run-off from agriculture	160	29
22. Poor water quality	207	12
23. Loss of endemic/native water species	174	24
24. Destruction of laying ground for fish	190	20.5
25. Oxygen depletion of the water	192	17.5
26. Water habitat destruction	171	25
27. Sedimentation and increased turbidity	149	30
28. Construction of shoreline Protection measures (rock, walls, breakwater sea walls)	219	9
29. Siltation of the river.	201	15.5
30. No changes in the Policy/Program Implementation	217	10.5

In terms of the problems encountered, the respondents agreed that the number one problem is the overflowing of water due to typhoon. This is really true and sad to note that every time there is a strong typhoon, there is the abundance of rainfall and this

allows the three dams Ambuklao, Binga and San Roque to release excess rainwater thus causing a massive flooding in the province of Pangasinan thus affecting the river system to overflow. It is also worthy to note that fishermen considered the insufficient technical

support of the government as their number 2 problem. The fishermen are waiting for the government support to the fishing industry especially after a calamity in order for them to recover from their economic losses.

Third and fourth problems are the irregular supply of feeds thus because of scarcity of supply causes the exorbitant price of feeds. It follows on the principle of law of supply and demand. Because of the scarcity of supply, the higher the price of supplies very much needed by the respondents.

Another big problem confronting the respondents is the harsh weather condition that affects the fishing industry. The country is always visited by strong typhoons due to our geographical locations as typhoon belt and at the same time due to the worsening climate change.

The respondents also attributed the difficulty in navigation due to narrowing of water ways due to the presence of unlimited construction of fish cages/ fish pens.

Periodic fish kill was also identified as a problem and followed by water pollution due to industrial and sanitary waste. The river system serves as sewerage system and when the waste content exceeded its limit, then fish kill occurs. The water contamination really caused the periodic fish kill that occurred in the province.

Another problem identified by the respondents is the construction of shoreline protection like building of rock walls, break water sea walls. Respondents considered it a problem probably because it hampers them and lack knowledge on the importance of it.

Respondents also viewed that with the implementation of the policy, nothing happens and there is still the proliferation of fish cages/fish pen thus causing the poor quality of water due to the commercial feeds being feed to the fishes inside the cages/pens. They still observed that despite the policy, there are still existing fish cages/ fish pen constructed thus contributing to the water pollution due to the fish feeds and siltation is also a problem due to soil erosion when it rain.

Other least problem identified was the clogging of water hyacinths. The presence of industrial and agricultural wastes ending up in the river system served as a nutrient supply of the water hyacinths and leading to depletion of dissolved oxygen in the water.

Poaching, fish pilferage, destruction of laying grounds for fishes, water habitat destruction, sedimentation, increased turbidity of water, loss of

endemic/ native water species, and run off from agriculture were also identified as lesser problems.

With the implementation of the No fish cages/fish pens Policy on the river system of Dagupan City, Binmaley and Lingayen in the province of Pangasinan, the above mention situations are now considered a least problem by the respondents. The policy had indeed contributed to the improvement of the fishing industry and the improvement of the aquatic ecosystem.

Table 4. Relationship of Selected Profile Variables to Socio-Economic Impact

Selected Profile	R-value	P-value
Age	-0.096	0.168
Educational Attainment	0.075	0.150
Income	0.376**	0
Length of years (experience)	0.239**	0
Number of Children	-0.123*	0

It can be gleaned from Table 4, that age and educational attainment of the respondents have no significant relationship to their perception on socio economic impact of the policy. This indicates that regardless of their age and educational attainment, these two profiles have no bearing to their perceived socio-economic conditions. Meanwhile, income, length of years as fishermen and the number of children in the family have a significant relationship in respondents' perception on the socio-economic impact of the implementation of the program. It shows that their income was affected in the implementation of the policy. With the removal of fish cages/fish pens along the river system, the owners of fish pen and fish cages had been deprived of an income, while the small scale fishermen and fish pond owners had enjoyed better income because of more fishes had been grown inside the fish pond, the water quality had improved and so bigger fish catch and higher prices, and with improvement of water ways the small scale fishermen had a better catch thus resulting to a higher income.

Length of years as fishermen also had a significant relationship to their perceived socio-economic impact. This indicates that the longer the year of experiencing fish farming, the higher the perception of the respondents on socio-economic impact of the policy. They can make a comparison of their fish catch before and after implementation and utilization of the fish pen/fish cages technology. With the length of their

experiences, they had made a significant observation on the positive and negative impact of the technology.

In terms of number of children in the family it automatically indicates that bigger family spends more, as compared to those with small family. Higher expenses requires higher income and with the implementation of the no fish pen/fish cages policy, those who were affected consequently suffered economically. In other situation, with the implementation of the policy, fish pond owners and small scale fishermen had also been dramatically improved economically thus enabling them to support their family.

Table 5. Relationship of Selected Profile Variables to Environmental Impact

Selected Profile	R-value	P-value
Age	-0.056	0.418
Educational Attainment	0.139**	0.008
Income	0.263**	0
Length of years (experience)	0.049	.354
Number of Children	-0.145**	0.005

The profile variables age and length of experience as fishermen have no significant relationship to the respondents' perception on environmental impact which connotes that maturity and length of doing the job as fishermen have no significant relationship in terms of their knowledge and skills in terms of the policy of no fish pen/fish cages along the river system. This indicated that they are already very much acquainted with the river system.

But, educational attainment, income and number of children have a significant relationship with their perception of the policy and its impact to the environment. The higher the income and educational attainment of the respondents, the higher was their perception on the environmental impact of the policy. This means that respondents with higher salary and educational attainment were more appreciative with the policy as it brings positive impact in the environment. Naturally with the removal of fish cages/fish pen along the river system, they perceived that the policy caused an improvement of the physical, chemical and biological conditions of the river ecosystem thus affecting their income; where the fish pond owner, both fish pond and fish cages owner had increase their income, while the fish cages/ fish pen owner have been greatly affected by losing an income.

CONCLUSION AND RECOMMENDATION

The respondents agreed that the policy have improved their socio-economic life. The number one impact is that they were able to save more money due to a better income, because they consider the fish cages/ fish pen operation is highly profitable and productive, they were able to send their children to schools, avail of loans and payment in local financial institution such as SSS, and are able to buy more appliances at home. Hence with the removal of fish cages/fish pen along the river system claimed to have reduced employment labor, hence their monthly income has increased, the demand for fish fry and fingerlings decreased, price of feeds became affordable.

Respondents also considered the program to be beneficial for the community and the policy is better. Because of this, fish pond building materials are affordable for them, improve the construction of their house dwelling and were able to put up other business venture. Better perception on the Socio-economic impact was observed by those respondents with higher income.

It shows that their income was affected in the implementation of the policy. With the removal of fish cages/fish pens along the river system, the owners of fish pen and fish cages had been deprived of an income, while the small scale fishermen and fish pond owners had enjoyed better income because of more fishes had been grown inside the fish pond, the water quality had improved and so bigger fish catch and higher prices, and with improvement of water ways the small scale fishermen had a better catch thus resulting to a higher income.

The Provincial Government Program of Ilog Ko Aroen Ko Bilayen Ko and with the Policy of No fish pen/fish cages along the river system should be continuously and strictly implemented to the entire province of Pangasinan. Its implementation should be monitored and evaluated as well by the provincial government.

The respondents agreed that the policy of no fish cages/fish pen along the river system have also an environmental impact. Because of the implementation of the policy they considered the number one impact is minimizing hazardous substances in water that posed health risk, the carrying capacity of the water had improved, resulted to increase in the size of fish catch thus commanding higher price. The level of water turbidity had improved, destruction of laying ground for fish is minimized, pathogenic organisms were reduced.

The fishing habitat is improved, thus increasing the population of endemic fishes.

It was also perceived by the respondents that the water quality of the River system such as salinity, DO, pH, turbidity, PO₄ and NO₃ content were all, in suitable range. The removal of the fish cages/fish pen also caused the water to be free of obstructions thus easier to navigate, navigational hazards are reduced, flash flood are reduced which lead to improvement of water flow, reduction of water pollution also caused the reduction of siltation, periodic fish kill and algal bloom.

It was found out that the respondents with higher educational attainment, higher income and respondents with more number of children perceived that the policy has brought impact to the environment. This equated to higher appreciation to the policy. Naturally with the removal of fish cages/fish pen along the river system, they perceived that the policy caused an improvement of the physical, chemical and biological conditions of the river ecosystem thus affecting their income.

The problem of over-crowding of fish cages was cited causing difficulty of navigation due to narrowing of water ways. The existence of the illegal fish pens/ fish cages, respondents claimed that there are no changes in the policy implementation. The occurrence of periodic fish kill due to water pollution caused by industrial and sanitary waste and construction of shoreline protection measures. Because of this situation, the rivers are silted leading to poor water quality due to water pollution from agri-fishing, resulting to oxygen depletion, water habitat destruction, destruction of the laying ground for fishes and loss of endemic /native fishes and lastly the problem of algal bloom.

With the implementation of the policy, it is hoped that better impact to the environment and to the socio-economic status of the fish farmers within the three municipalities will be achieved. The fish farmers and local government should work hand in hand in order to eradicate illegal activities to fully improve the river system for their benefits in terms of higher catch and higher income.

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