Physical, Socio-Economic, and Impact of Fishpond Aquaculture: The Case of Women's Cooperative

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Abstract— Aquaculture is one of the driving tools to solve food security and alleviating poverty incidence to Filipino family. Similarly, cooperative plays an important role to meet economic and social needs of people. This study aimed to assess and evaluate the Physical, socio-economic, activities and impact of fishpond women's cooperative in the municipality of Rosario, Northern Samar. The study employed descriptive research in obtaining necessary data. Researchers made in-situ measurement of the physico-chemical characteristics of fishpond water, FGD, and survey questionnaire in gathering data. Then, data were analyzed through SPSS. The study revealed that the cooperative operated for than ten years, however, membership had significantly decreased. They were facing challenges that need to be addressed such as mismanagement, lack of technical know-how on fishpond and cooperative operation and management among members and lack of capital to sustain the operation of the cooperative. Majority of the members belong to below poverty threshold with family members of six and most of them obtained elementary grades only. Moreover, cooperative members were not satisfied and perceived fewer benefits with the cooperative activities. Educational attainment, family monthly income, household size, nature of membership, years in cooperative and monthly income generated from the cooperative are variables showed direct affect to the cooperative activities, impact, satisfaction level and constraints of the cooperative activities. However, the fishpond has still a good water quality and considerably desirable for aquaculture development that needs to be maximize for cooperative members benefit. Thus, the cooperative members together with the assistance of the government and other concern agencies should strengthen the operation and management of Rosario Women's Cooperative for it is potential for economic and social improvement among members and its community.

Index Terms— cooperatives, women, women's cooperative, fishpond, challenges, impact

1 INTRODUCTION

Aquaculture is considered as one of the fastest industries of food-producing source in the world. Understanding the basic principles of aquaculture production is likewise essential in understanding and working in this kind of industry. Aquaculture involves knowledge and skills in various aspects of production such as spawning, production of feeds, pond construction, and management (FAO, 2012; FAO, 2014). Moreover, as reported by FAO (2012) aquaculture like agriculture, has similar objective which is to increase the natural production of food supply. Since mid-1990s aquaculture has contributed in improving the total fish production worldwide. Based on FAO data, the total fish production increasingly scaled from 20.9% in 1995 to 32.4% in 2005, and then continually increased in 2010 to 40.3% worldwide. Similarly, the world food fish production had contributed to human consumption by 47% in 2010 from only 9% in 1980.

In the Philippines, aquaculture has been practiced since early 1970s in a diverse ecosystem and involved many species and farming practices. Most likely, seaweed farming, milkfish, tilapia, shrimp, carp, oyster, and mussel are the aquaculture products produced. Concomitantly, FAO-Philippines (2005) reported that aquaculture has significantly contributed much to food security, employment and foreign exchange earnings in the Philippine economy. According to Camacho and Laguna (1988), from 1977-1986 the country's aquaculture sector and fishing industry have registered the highest growth rate of 12.5%. More so, in 1970s the contribution of aquaculture to the total fish production was 24% in 1986 as compared to only 8% in the 1970s. On other hand, the mariculture subsector in 1982-1986 had recorded the highest growth rate of 10.2%. While, there is a 33% highest growth rate has shown in the brackish water fishpond subsector. Meanwhile, there is a negative growth rate in freshwater aquaculture production due to aquaculture activities in Laguna de Bay and declining rate of commercial production of the freshwater fishponds.

Apparently, as stressed by Bronmark and Hansson (2005) water is an indispensable environment for fish for their physiological functions. Fishes are absolutely dependent to water in order for them to breathe, grow, excrete wastes, maintain a salt balance, and reproduce. According to Boyd (1990), the physicochemical parameters as water quality indicators can be easily observed. These serves as the most important limiting factor in fish culture which includes some such as color, odor, temperature, transparency, acidity, alkalinity, hardness, pH, dissolved oxygen (DO), biological oxygen demand (BOD), total dissolved solids (TDS), and electrical conductivity (EC) and each of these parameters has a standard value for fish culture as recommended by James (2000). According to Swann (1993), good water chemistry is an essential factor for an efficient fish and aquaculture production. Certainly, maintaining the good water quality is necessary for a healthy and productive fish culture.

Notwithstanding, majority of fish culture all over the world is cultivated in ponds. Pond ecosystems can be easily influenced by its water quality and this is necessary for a higher yield of fish production (Swann, 1993). Davenport (1993) reported that fishes are cultivated in ponds in most of the coun-

tries however the culturists are not so much aware on the importance of water quality management. He also suggested that once the culturists are properly guided and knowledgeable on water quality management practices, the maximum fish farmers would have a high production hence they able to apply low input cost in their production and get high output of harvest.

Furthermore, some of the aquaculture and fishpond sectors are being managed by the cooperative. According to Sharma, Simkhada, & Shrestha (2005), cooperatives are established by individuals with common goal for beneficial economic interest and provided a unique tool for achieving perceived economic goals, improving bargaining power and practicing business transactions.

Likewise, Cook (1995) described cooperatives as services platform that can provide quality inputs, mechanization, agricultural loans, agricultural extension programs, capacity building, marketing strategies, and other economic activities among its members. Apparently, farmers' cooperatives provide the smallholder farmers with economics scale from cheaper and efficient access to inputs, production technologies, and marketing strategies The survival and operations of cooperatives depend largely to its country's political and economic environment because cooperatives exist within the wider economy of a certain nation (Gamba & Komo, 2009; Calkins & Ngo, 2005). With this, the researchers are encouraged to investigate the physical, activities, and impacts of fishpond in Rosario as being operated by a women's cooperative.

2 Objectives of the Study

This study determined the following objectives: (1) socio-demographic and household profile of the fishpond cooperative members; (2) level of satisfaction and constraints of activities of fishpond women's cooperative; (3) determine relationship of socio-demographic, cooperative membership profile, and level of satisfaction and constraints of activities of fishpond women's cooperative; and (4) asses the physico-chemical characteristics of the fishpond water.

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3 Methodology

Study Area and Sampling Sites

This study was conducted in Rosario, Northern Samar. Rosario is classified as a 5th class municipality in the province of Northern Samar, Philippines. It has a geographical coordinates of 120 31′ 25″ latitude and 1240 25′ 28″ longitude. As indicated in the 2015 census, it has a population of 10,520 people. It is bordered in the west by Lavezares and Victoria to the south. This municipality is composed of eleven (11) barangays. Moreover, the Rosario belongs to the protected area of Biri-LAROSA that was proclaimed through RA 7586 or otherwise known as National Integrated Protected Areas System (NIPAS) Act of 1992 and Presidential Proclamation No. 291 in 2000 as a declared protected landscape and seascape because of its biodiversity and ecological significance. Figure 1 shows the map of Rosario and the Biri-LAROSA. Specifically, the sampling sites of the study were fishpond area of the said municipality which is being presently managed by the Rosario Women's Cooperative. The map of the three sampling sites of the study is shown in Figure 2 as it is indicated in the fishpond area managed by the Rosario Women's Cooperative.

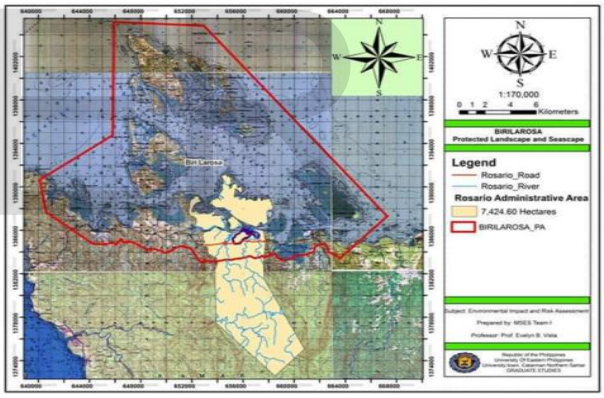

Figure 1. Map of Biri-LAROSA covering the municipality of the Rosario as composite of the protected landscape and seascape.

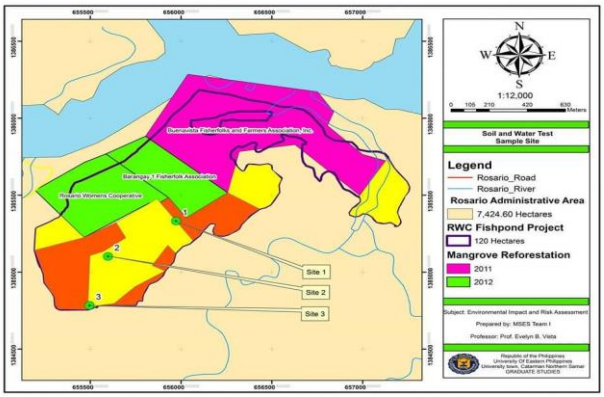

Figure 2. Map of the Fishpond Area Managed by the Rosario Women's Cooperative indicating the Three (3) sampling sites of the study.

Data Collection

The data were gathered through the survey questionnaire. Then, focus group discussion (FGD) was employed to gather data on historical transect and impact of cooperative to its members. While, the physico-chemical and biological parameters of the water quality of the fishpond, such as temperature, pH, electrical conductivity, density, and salinity were collected through in-situ measurement from its three sampling sites of the fishpond. Moreover, the researchers used a Hanna multi-tester of water quality and Anatago model of refractometer instruments in their in-situ measurement.

Sampling Techniques

The researches involved two sampling techniques. First, stratified sampling technique was used to identify the three sampling sites of the fishpond area for them to conduct the in-situ measurements on the water quality of the fishpond. Second, purposive and complete enumeration sampling techniques were employed by the researchers in choosing the respondents of the study who answered the survey questionnaire and participated in the focus group discussion.

Statistical Analysis

Descriptive statistics such as frequency and percentage were employed to describe the socio-demographic profile, household profile, cooperative profile such as impacts and satisfaction level, and constraints of cooperative activities. Then, mean and standard deviation were also utilized to describe some of the respondents' profile and the physico-chemical parameters of the water quality of fishpond. Moreover, Pearson r and chi-square were used to determine the significant relationship socio-demographic profile, cooperative membership profile, and level of satisfaction and constraints of activities of fishpond women's cooperative.

3 Results and Discussions

1. Socio-demographic Profile of the Fishpond Cooperative Members

Table 1 reveals the socio-demographic profile of the fishpond cooperative members of Rosario Women's Cooperative.

Age. As shown the table, most (8 or 40%) of the cooperative members belongs to age range to 41-50 years old and having a mean age of 52.60 years old. Then, based on the data, the youngest member of the cooperative is 30 years old, while, the oldest member is 82 years old. The data implies that most of cooperative members are in the middle age.

Gender. The data shows that most of the cooperative members are male (13 or 65%) as compare to female (7 or 35%). It quite intriguing that it is a women's cooperative however, there are more male active members than female. Based on the FGD results, there are more male who are members of the cooperative in the sense that they play an important role in the fishpond production specially on laborious aspect such as maintenance of dikes and other extraneous activities in the fishpond management.

Civil Status. Table 1 presents that most of the cooperative members are already married (13 or 65%) than to those single and separated (2 or 10%) and widow/widower (3 or 15%).

Table 1. Frequency and Percentage Distribution on Socio-Demographic Profile of the Cooperative Members

Demographic Profile	Frequency (f)	Percentage (%)
Age		
30 – 40 years old	5	25.0
41 – 50 years old	8	40.0
51 – 60 years old	1	5.0
61 – 70 years old	3	15.0
71 – 80 years old	2	10.0
81 – 90 years old	1	5.0
Total (Mean=52.60 years old)	**20**	**100.0**
Gender		
Male	13	65.0
Female	7	76.0
Total	**20**	**100.0**
Civil Status		
Single	2	10.0
Married	13	65.0
Separated	2	10.0
Widow/Widower	3	15.0
Total	**333**	**100.0**
Educational Attainment		
Elementary Level Only	6	30.0
Elementary Graduate	1	5.0
High School Level Only	5	25.0
High School Graduate	4	20.0
Technical/Vocational	1	5.0
College Level Only	1	5.0
Bachelor's Degree	1	5.0
Master's Degree	1	5.0
Total	**20**	**100.0**
Family Monthly Income		
Less than 5,000	2	10.0
5,001-10,000	9	45.0
10,001-15,000	7	35.0
15,001-20,000	1	5.0
30,000 and above	1	05.0
Total (Mean= P 5, 435.00)	**20**	**100.0**
Household Size		
1-2 members	2	10.0
3-4 members	5	25.0
5-6 members	8	40.0
7-8 members	3	15.0
9-10 members	2	10.0
Total (Mean= 6)	**20**	**100.0**

Educational Attainment. As reflected in Table 1, there 6 or 30% who are elementary grades only; 5 or 25% are high school level; 4 or 20% are high school graduates. Then, the rest of the members are elementary graduate, technical/vocational graduate, college level only, and master's degree holder, in which,

1 or 5% of some members of the cooperative had obtained an educational attainment, respectively.

Family Monthly Income. Most of the cooperative members have earned a family monthly income of P 5,001-P10, 000 (9 or 45%), as it is also reflected on its mean family monthly income of P 5, 435.00. This implies that that most of the cooperative members are still belong to below poverty line in the sense that most of the families have an income of less than P9,063.75 with an average family size of 5 members (PSA, 2018).

Household Size. As shown in Table 1, most of the cooperative members have a household size range of 5-6 (8 or 40%) and having an average size of 6 members in the family.

2. Household Profile of the Fishpond Cooperative Members

Table 2 presents the frequency and percentage distribution on the household profile of the fishpond cooperative members of Rosario Women's Cooperative.

Table 2. Frequency and Percentage Distribution on Household Profile of the Cooperative Members

Household Profile	Frequency	Percentage
Land Ownership Type	**f**	**%**
Borrowed	4	20.0
Owned	15	75.0
Title Deed	1	5.0
Total	**20**	**100.0**
House Ownership Type	**f**	**%**
Borrowed	1	5.0
Owned	19	95.0
Total	**20**	**100.0**
House Condition	**f**	**%**
Made up of light materials	1	5.0
Concrete materials	3	15.0
Combination of light and concrete materials	16	80.0
Total	**20**	**100.0**

Land Ownership Type. Table 2 disclosed that majority (15 or 75%) of the cooperative members responded that they owned the land where they built their houses. While, 4 or 20% just borrowed the land and only 1 or 5% has title deed.

House Ownership Type. As reflected in the above table, majority (19 or 95%) of the cooperative members responded that they owned their houses. While, only 1 or 5% had borrowed the house they are living with.

House Condition. In terms of house condition, still majority (16 or 80%) of the cooperative members answered that their houses were made from the combination of light and concrete materials. While, others are made up from concrete materials (3 or 15%) or made up from light materials (1 or 5%) only.

3. Impacts, Benefit, Level of Satisfaction and Constraints of Rosario Women's Cooperative

Table 3 presents the frequency and percentage distribution on impacts, benefit, level of satisfaction, and constraints of Rosario Women's Cooperative.

Impacts of Cooperative on the Members. Table 3 showed that most of the cooperative members responded that the cooperative has no impact (11 or 55%) to them. While, others have identified the impacts to them such as changes in lifestyle (4 or 20%), changes in income (3 or 15%), changes in diet (1 or 5%), and changes in production (1 or 5%). The findings of this study is in contrast to the study of Edun, Akinrotomi, and Eshiett (2018) stated that most of the cooperative members in an aquaculture development said that cooperative had increased their income as an impact to each member, while, on this study most of the members did not feel the impact of the cooperative to them.

Table 3. Frequency and Percentage Distribution on Impacts, Benefits, Level of Satisfaction and Constraints of Rosario Women's Cooperative

Indicators	Frequency	Percentage
Impacts of Cooperative on the Members	**f**	**%**
Changes in Income	3	15.0
Changes in Diet	1	5.0
Changes in Production	1	5.0
Changes in Lifestyle	4	20.0
None	11	55.0
Total	**20**	**100.0**
Benefit of Cooperative	**f**	**%**
Increase Financial Returns	2	10.0
Improved Aquaculture Technique	4	20.0
Encourage Government Intervention	5	25.0
Involvement in Mangrove Reforestation	9	45.0
Total	**20**	**100.0**
Level of Satisfaction of Cooperative Members	**f**	**%**
Satisfied	2	10.0
Fairly Satisfied	10	50.0
Not Satisfied	7	35.0
Neither Satisfied Nor Not Satisfied	1	5.0
Total	**20**	**100.0**
Constraints to Cooperative Activities	**f**	**%**
Mismanagement	6	30.0
Lack of Capital Accumulation/Insufficient of Fund	6	30.0
Lack of Technical Know-how among Members	3	15.0
Presence of Diseases and Predator	4	20.0
Labor, Maintenance, and Harvesting Cost	1	5.0
Total	**20**	**100.0**

Benefits of Cooperative. Most of the cooperative members have identified that the benefit of the cooperative to them is the involvement of mangrove reforestation (9 or 45%). While, other benefits agreed by them are, encourage government intervention (5 or 25%), improved aquaculture techniques (4 or 20%), and increase of financial returns (2 or 10%). The present

study had generated new benefit to the cooperative which is on the involvement in mangrove reforestation program, while, the study of Edun, Akinrotomi, and Eshiett (2018) affirmed that the benefits they obtained from the cooperative were encourage government interventions, expansion of farmlands, and increase of financial returns.

Level of Satisfaction of Cooperative Members. As can be gleaned from Table 3, most of the cooperative members are just fairly satisfied (10 or 50%); 7 or 35% of them are not satisfied. Then, only 2 or 10% are satisfied and 1 or 5% have answered neither satisfied nor not satisfied. The findings of this study is in contrast to the study of Edun, Akinrotomi, and Eshiett (2018) that most of the cooperative members in an aquaculture development were satisfied and very satisfied, unlike with this study, mostly members are not satisfied.

Constraints to Cooperative Activities. As shown in the table above, there are five (5) constraints to cooperative activities that are identified such as mismanagement (6 or 30%), lack of capital accumulation/insufficient fund (6 or 30%), presence of diseases and predator (4 or 20%), lack of technical know-how among members (3 or 15%) and labor, maintenance, and harvesting cost (1 or 5%). The result of this study has a similar observation on the study of Edun, Akinrotomi, and Eshiett (2018) revealed that insufficient capital accumulation, communal crisis and mismanagement are said to be constraints in fishpond management which is also observed in the present study.

4. Relationship Between the Socio-demographic Profile and the Impacts, Level of Satisfaction and Constraints of Rosario Women's Cooperative

Table below shows the relationship between the socio-demographic profile and the impacts, level of satisfaction, and constraints of Rosario Women's Cooperative.

Impacts of Cooperative. As shown in the table above, among the socio-demographic profile of the cooperative members, the family monthly income shows significant relationship to the impacts of cooperative on the members. Likewise, there is a high significant relationship between the educational attainment of the cooperative members and the impacts of the cooperative to them. The data means that educational attainment and family monthly income are direct associated factors to feel the impacts of the cooperative among the members of Rosario Women's Cooperative. It implies that the higher the educational attainment and family monthly income of the members they would understand and appreciate the importance of the cooperative. Moreover, there is a high significant relationship between the years in cooperative and the impacts of the cooperative to its members. This means that the longer the years the members joined the cooperative the more they would feel and appreciate the impacts of the cooperative to them. Unlike, nature of membership and monthly income generated from cooperative posed no significant relationship to its impacts of the cooperative.

Level of Satisfaction of Cooperative Activities. The data above concludes that its only household size shows a significant relationship to the level of satisfaction of members to cooperative. It means that the more family members joining the cooperative the more satisfied they are to the cooperative activities because they will be benefited from the income obtained from the cooperative. While, other socio-demographic profiles do not show significant relationship to the satisfaction of members to cooperative. Furthermore, the result revealed that there is significant relationship between the nature of membership and the level of satisfaction of cooperative members. Moreover, there is a high significant relationship between the monthly income generated from cooperative and their level of satisfaction to cooperative activities. This means that nature of membership and the higher the income generated of members from the cooperative the more they are satisfied to the cooperative activities. However, the number of years in cooperative of members does not affect their satisfaction level on the cooperative activities.

Constraints to Cooperative Activities. Result of the data indicates that it's also household size shows a significant relationship to the constraints to cooperative activities. The data suggests that if there are more families joining the cooperative there are more manpower who will work on the activities of the cooperative. While, other socio-demographic profiles do not show significant relationship to the constraints to cooperative activities. Likewise, among the cooperative membership profile it's only the nature of membership to cooperative shows high significant relationship to the constraints of cooperative activities. This only means that type of membership the member has in the cooperative vary their perception on the constraints they felt on to cooperative activities. This implies that regular members do really feel the problems and challenges that they are experiencing of on their cooperative activities. On the other hand, years in the cooperative and monthly income generated from the cooperative are not identifying factors to the constraints of the cooperative activities.

Table 4. Test of Correlation Between Socio-Demographic Profile and Impact, Level of Satisfaction and Constraints of Cooperative Members of Rosario Women's Cooperative

Socio-Demographic Profile	Impacts	Level of Satisfaction	Constraints
Age	0.204^{ns}	0.392^{ns}	0.947^{ns}
Gender	0.198^{ns}	0.270^{ns}	0.245^{ns}
Civil Status	0.262^{ns}	0.632^{ns}	0.871^{ns}
Educational Attainment	0.001**	0.190^{ns}	0.840^{ns}
Family Monthly Income	0.012*	0.446^{ns}	0.944^{ns}
Household Size	0.710^{ns}	0.003**	0.005**
Nature of Membership	0.533^{ns}	0.043*	0.001**
Years in Cooperative	0.010*	0.076^{ns}	0.321^{ns}
Monthly Income Generated	*	0.001**	0.364^{ns}
	0.145^{ns}		

Legend:
***** - Correlation is significant at the 0.05 level
****** - Correlation is significant at the 0.01 level
ns – No Correlation

5. Physico-chemical Characteristics of the Water Quality of Fishpond Ecosystem of Rosario Women's Cooperative

Table 5 presents the physico-chemical characteristics of the water quality of fishpond ecosystem of Rosario Women's Cooperative.

Temperature. As shown in Table 5, the three (3) sampling sites recorded with varied water temperature ranges from 30.100C to 33.600C. Study Site 1 recorded with the lowest temperature among the three sites, while Study Site 3 obtained with the highest temperature among them and its average water temperature is 31.840C. This result is similar to the study of Munni, Fardus, Mia and Afrin (2013), that the water temperature of fishpond in their study area ranged from 300C to 380C. According to Kumar, Karthik, and Rajakumar (2017), the optimum water temperature for fish survival should be 20-300C in the sense that water temperature is an important biologically significant factor for metabolic activities of the organism (fish) in the water bodies. However, the previous study suggested that water temperature may depend on the seasons, geographic location and sampling time. However, Abdullahi, Ahmad, Ibrahim, and Sarkin-Bair (2014) suggested that the suitable temperature for fish farming is 31-360C as used in the study on the physico-chemical analysis of fishpond water in Candaba, Pampanga of Sandoval, Cada, Labana, & Dungca (2017). With this standard, the water temperature of the fishpond of Rosario Women's Cooperative is within the standard and said to be favorable for fish production.

pH. In terms of pH of fishpond water, the data shows that the minimum pH obtained is 6.12 (site 3) and its maximum pH is 8.65 (site 3). This result is similar to the study of Munni, Fardus, Mia and Afrin (2013), that the water pH of fishpond in their study area ranged from 6.8 to 7.11 pH and which is also similar to study of Kumar, Karthik, and Rajakumar (2017) that the fishpond water pH ranged from 7.63 to 8.43 pH. While, the study of Sandoval, Cada, Labana, & Dungca (2017) had obtained pH measure ranges of 7.76 to 9.57. Accordingly, pH is an important limiting factor in fish culture needed for survival and growth of fish that should be ranged from pH 6 to 9. Based on the study, the pH level of the fishpond water ranged from 6.12 to 8.65, therefore, it is within the desirable limit for and standard value of water pH for fish production.

Electrical Conductivity. The data above shows that the electrical conductivity of fishpond water all throughout the sampling sites is the same which is measured 200 µS/cm. This result is similar to the study of Kumar, Karthik, and Rajakumar (2017) and Sandoval, Cada, Labana, & Dungca (2017) that the electrical conductivity of fishpond water in their study areas are within the range of 290.30 to 405.10 µS/cm and 220 to 489 µS/cm, respectively. The electrical conductivity in water is used evaluate the purity of water which is independent on the ionic concentration and water temperature. It is also regarded as an indication of its freshness of water body which is necessary for primarily productivity and fish production. According to WHO (1986), Boyd (1990) as cited in the study of Sandoval et. al (2017), the desirable limit for electrical conductivity of water should fall between 200-1500 µS/cm. Given the actual measurement of electrical conductivity of Rosario Women's Cooperative fishpond, the value indicates that it within the standard limit. Thus, the water quality of the fishpond is still in good quality condition and favorable to fish production.

Table 5. Physico-Chemical Characteristics of Water Quality of Fishpond Ecosystem of Rosario Women's Cooperative

Physico-Chemical Parameters	Study Site 1 Mean	Study Site 2 Mean	Study Site 3 Mean	Over-all Mean
Temperature (^{0}C)	30.37	31.93	33.23	31.84
pH	6.36	8.37	7.17	7.3
Electrical Conductivity (uS/cm)	200	200	200	200
Density (g/mL)	1.023	1.022	1.018	1.021
Salinity (ppt)	30	29	25	28

Water Density. As shown in the data in Table 10, the water density obtained a measurement that ranges from 1.011 ppt (lowest, site 3) to 1.024 ppt (highest, site 1) and a mean density of 1.021 ppt. The brackish water which is used for fish pond production should have a density between 1.005 to 1.010 ppt. The density of the fishpond water in Rosario is quite above the maximum limit of 1.010 ppt. So, however, the increase of density is still negligible.

Salinity. As to the salinity of the fishpond water of Rosario Women's Cooperative the researchers got an actual measurement of 15 ppt to 30 ppt across the three sampling sites. Site 1 has the highest salinity of 30 ppt, while site 3 has the lowest salinity level of 25 ppt. However, its mean salinity level of the fishpond is 28 ppt. Salinity exhibits a significant role in the growth of culture organisms for it is considered as key factor affecting the water density and growth of aquatic organisms (Kumar, Karthik, & Rajakumar, 2017). Based on the study of Kumar et. al (2017), they obtained a salinity level of fishpond water in their study area of 11 to 16 ppt only which is lower than the obtained measurement of the present study. But nevertheless, the salinity is still within the desirable limit of 0.5 to 30 ppt for fish culture using the brackish water type. Therefore, the salinity level of fishpond water ($\bar{x}$=28 ppt) of Rosario Women's Cooperative is still favorable for aquaculture production.

4 Conclusion

Most of the members of the cooperative are 41-50 years old, male, married, elementary graduates only, with a family income of less than poverty threshold level (P9,063.75), and having an average family size of 6. In terms of household profile, majority of the members owned the land and houses that are made up from combined light and concrete materials. Then,

most of the cooperative members' source of income is still fishing and farming, regular members for ten years, and earned a monthly income of lower than P5, 000 from the cooperative. Moreover, members felt no impact with cooperative, but they benefited by the involvement in the mangrove reforestation projects of DENR, most of them were not satisfied, and they were facing problems on mismanagement and lack of capital or insufficient fund. Then, the educational attainment showed significant relationship to the impact of the cooperative; while, household size had shown significantly to the level of satisfaction and constraints of the members on cooperative activities. Moreover, nature of membership showed significant relationship to level of satisfaction and constraints of the members on cooperative activities; there was also significant relationship shown between the years in cooperative and its impact to cooperative activities and as well as highly significant relationship shown between monthly income generated from cooperative and their level of satisfaction to cooperative activities. Based on the physico-chemical characteristics of the water quality in the fishpond, all of these parameters such as temperature, pH, electrical conductivity, density, and salinity are still within the desirable limit for fish culture production. Therefore, the water quality of Rosario Women's Cooperative is still in good quality condition.

5 Recommendations

Based from the salient findings of the study, the researchers have advanced the following recommendations:

The Rosario Women's Cooperative management board and officers should encourage the members to conduct and attend capability building on fishpond management and operation through seminars, trainings, and workshops for them to have technical know-how on cooperative and fishpond operations. Furthermore, the LGUs should give tangible support to the cooperative hence it is government recognized and to maximize the fishpond for higher aquaculture productions. And, strong partnership among government officers, NGOs and the cooperative should be foster for further development of Rosario Women's Cooperative. Moreover, the cooperative members should encourage utilization of modern facilities and technology to improve their aquaculture productions, farmers' productivity and improvement of their monthly income. Then, the government and financial institutions should provide social infrastructure and credit facilities to the cooperative members to enable them acquire necessary equipment and funds for improving the aquaculture production and income among members of the cooperative. Finally, encourage more members to join the cooperative to strengthen its manpower and machinery for the development and improvement of cooperative management and operations.

Acknowledgment

The researchers thank the Rosario Women's Cooperative members for allowing us to conduct our study and cooperating with the researchers during the conduct of the study.

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