1. **INTRODUCTION**

**CRABBING INTO AN UNCERTAIN FUTURE: THE BLUE SWIMMING CRAB FISHER IN COASTAL TOWN OF EASTERN PHILIPPINES**

**Pedro S. Cabrales#1, Jesus T. Racuyal\*2, Alfredo G. Mañoza\*3**

College of Arts and Sciences#, College of Fisheries and Marine Sciences\*,

Samar State University, Catbalogan City, Samar, Philippines   
1petercabrales63@yahoo.com

3jesusracuyal@yahoo.com

2 agmanosa@yahoo.com

**Abstract**

*This research project sought to find out the socio-economic status of the small-scale fishers of the blue swimming crab (Portunus pelagicus) in Samar, considering the diminishing volume of catch of the species in the recent years. Using a blend of quantitative and qualitative methods, the study employed an interview schedule, focus group discussion (FGD) and observation in collecting data not only from the fishers but also from other sectors directly involved in the blue swimming crab industry.*

**Keywords**: blue swimming crab, Samar fishery industry, socio-economic status, small scale fishers

This study described the socio-economic status of the fishers of small-scale blue swimming crab (*Portunus pelagicus*) or “karawasan” in Samar. These fishers are the primary suppliers of the blue swimming crab to the market. The fishers’ socio-economic status comprised of their occupation and income, household condition, location, educational attainment, and the role of women in the household dependent on fishing. The study also incorporated the role of associated sectors affecting the crab fishers—such as the consumers, dealers, middlemen, and crabmeat processors.

A primordial study on the blue swimming crab conducted by Batoy, Pilapil and Sarmago (1988) investigated the biology and ecology of the species. By following the same thread, Germano and Melgo (2003) looked into its population, reproductive and fishery biology in Leyte and Samar. Later studies examined its appropriate food type, prey density and stocking density in the larval rearing in the Visayas area (Baylon, 2007), and in Tamil Nadu, India (Josileen, 2011). Its natural diet and feeding was also studied by Zainal (2013) along the coastal waters of Bahrain. Campos-Del Norte and Villarta (2008) explored the growth, recruitment and mortality of the crustacean in Pilar and Capiz Bays, Northern Panay, Philippines. Furthermore, Sorio (2011) studied its length-weight relationship in Maqueda Bay in Samar.

Mandated by their respective government’s concern for ensuring long-term sustainability, Svane and Hooper (2004) conducted a study on the fishing stock of the blue swimming crab in Australia, on the one hand, and Mehanna, Khvorov, Al-Sinawy, Al-Nadabi & Al-Mosharafi (2013) in the coastal waters of Oman. Meanwhile, Campos-Del Norte and Villarta (2004) examined its general catch rates in various fishing grounds in Panay, Philippines. Moreover, in Parangipettai Coast in India, Anand and Soundaparandian (2004) introduced sea-ranching so as to cope with the problem of depleting population of the species in the region.

Biological and ecological sustainability of the species are tied up with the socio-economic activities of the blue swimming crab fishers. Thus, Racuyal, Cabrales and Patosa (2009) studied the average income of the fishers, equipment used and sources of capitalization of fishers that operated proximate to the coastal village of Ibol, Catbalogan, Samar, Philippines. The research further revealed the cultural practice of patron-client exploitative relationship which was contributory to the crabbers’ suffering from marginalization. Arcales (2011) later disclosed that crab meat processors who bought catch from fishers in the area were the ones who imposed the price on the latter, and thus further exploiting their already deprived socio-economic conditions.

In the 1950s the marine waters of Maqueda Bay along Catbalogan, Samar was found to be abundant in marine fish resources as reported by Warfel & Manacop (1950). Even until the 1980s, the standing stock of blue swimming crab was estimated at 22 MT with an equally abundant distribution of species at 20 m isobaths (Villoso and Hermosa, 1983). The recent years, however, have seen the depletion of the stock of blue swimming crab fishery elsewhere in the country which may have been largely affected by the dynamic demographic factors (Brander, 2007; FAO-UN, 2006; Aaheim & Sygma, 2000) as well as climate change (Pauly, 2006; Daw, et al., 2012). In Ragay Gulf, Philippines, for instance, the dwindling supply of blue swimming crabs prompted Ingles (1988) to craft management strategies and programs aimed at averting this dismal condition. Based on similar observations, Green, et al. (2004) recommended that income provisions to the fishers should be made through fishing and other marine-related industries in the Central Visayas region (p.11). Acting on a such deplorable condition, the Philippine Department of Agriculture—Bureau of Fisheries and Aquatic Resources (DA-BFAR, 2010) formulated the Philippine blue swimming crab management plan which recommended institutional measures to curb the depletion of the breeding stock as by introducing alternatives (collapsible trap) to the indiscriminate crab-catching methods.

The declining stock of the blue swimming crab fishery inevitably affect not only the socio-economic gains of the industry in general, but also the livelihood of the blue crab fishers, in particular. Along this aspect, however, the afore-cited studies only offered but meagre and inadequate information on the socio-economic status of the crab fishers and their household conditions. Racuyal, et al. (2009), ably described, though in a microcosm, this pertinent aspect of the fishers, but was found wanting on the role of women and mothers in the livelihood matrix. Even PRIMEX-ANZDEC (1996) investigated on the role of women in fisheries in general but did not specify their activities in the blue swimming crab industry.

The significance of the role of women in the crab fishery livelihood deserves some concern. Women, have been traditionally considered as the weaker member of Philippine society, and were viewed mostly as supporters than leaders in the community (Siason, 2004). Thus, fisherfolks generally involved only men in their activities because of the image that only men go to sea in their fishing boats (Siason, 2004; p. 145). Consequently, this kind of gender bias reinforces the male-dominated leadership and decision-making structures and processes (Siason, 2004).

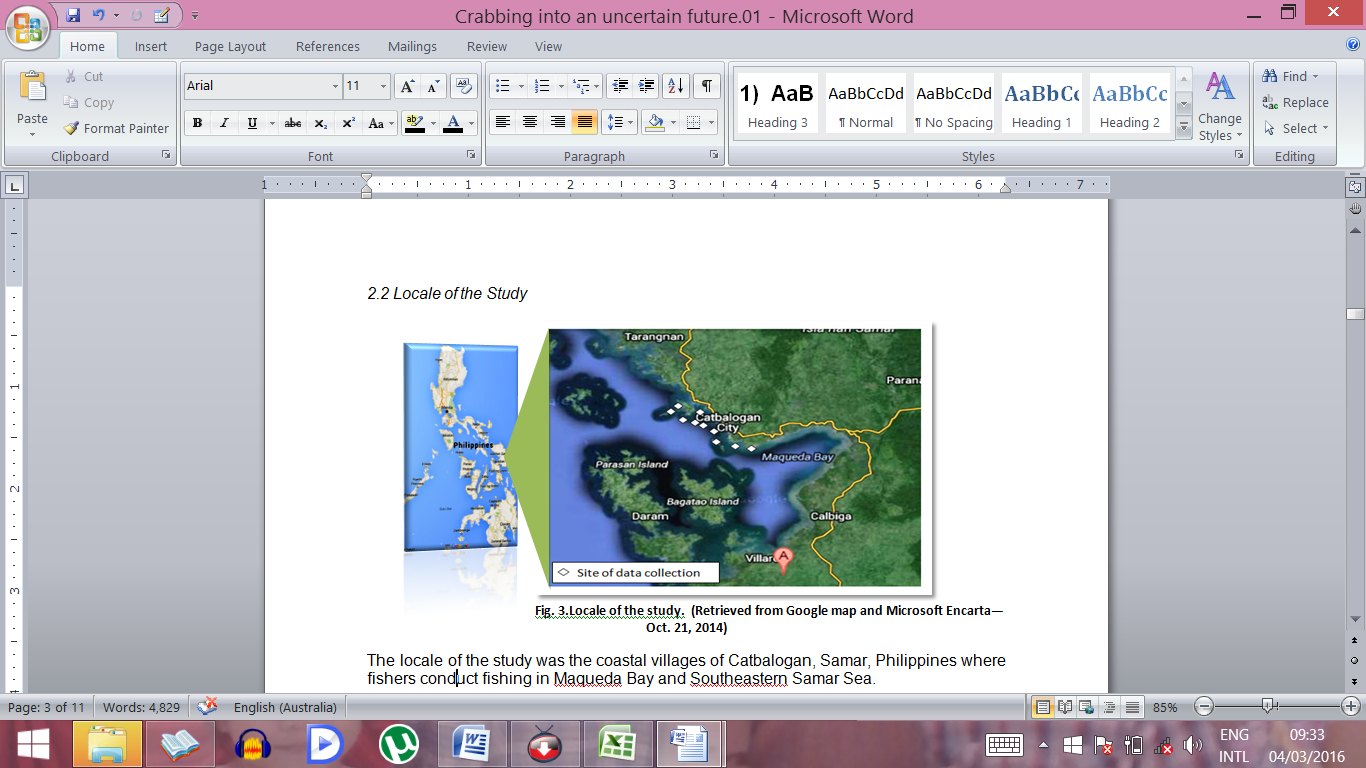
Hence, this study attempted to describe the socio-economic status of the small-scale blue crab fishers, and at the same time, explored the role that women play in the blue crab fishery.

1. **METHODOLOGY**

*2.1 Research Design*

The study utilized a descriptive research design comprising of both quantitative and qualitative approaches to research. The quantitative method made use of interview schedule while the qualitative approach employed in-depth interview, focus group discussion (FGD) and observation.

*2.2 Research Locale*



*Fig. 3.Locale of the study*

The locale of the study was the coastal villages of Catbalogan, Samar, Philippines where fishers conduct fishing in Maqueda Bay and Southeastern Samar Sea.

* 1. *Participants*

A total of 205 respondents provided the data source. The primary respondents were comprised of 91 crab fishers, and the secondary respondents of 115 persons which consisted of consumers (87), dealers (12), crab processors (3), and middlemen (13). They were all selected through purposive sampling. The crab fishers, dealers, middlemen and processors were approached in their strategic locations, while consumers were selected from among those who buy crabs in the public markets and fish landing sites or waterfronts in various villages of Catbalogan.

*2.3 Instrumentation*

The interview schedule was adapted from the questionnaire of Kalikoski & Vasconcellos (2012) but modified to fit the objectives of the study. It collected data on respondents’ fishery-related activities, as well as their home condition and utilities, educational attainment, role of women, buying patterns, monthly income and catch per unit effort (CPUE). The CPUE represents the amount of catch that is taken per unit of fishing gear, e.g. number of crabs per pot-months, and is normally used as an index of abundance. To determine the CPUE, we needed to find the catch per unit effort per fishing operation per day.

The FGD was used to collect qualitative data on the role of women. This was also followed up by in-depth interview of key informants so as to validate information generated from the interview schedule and FGD. The FGD guide was developed through concerted efforts of experts in social science and fisheries at the Samar State University, Samar, Philippines. Finally, the observation technique was used to validate data provided in the questionnaire and FGD.

* 1. *ata Gathering Procedure*

Upon the determination of objectives of the study, data gathering instruments were finalized, followed by pilot testing and

validation. Trained enumerators collected data via the interview schedule. FGD was conducted during the day or after the interviews are made, while observation and in-depth interview were used to check consistency of the information that was provided by the respondents. Quantitative data were subjected to analysis using the Statistical Package for Social Science (SPSS, Ver. 16.01 WIN RC, S/N 5057979).

Table 1. Profile of primary respondents

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | Female | % | Male | % | Total | % |
| Number | 4 | 4% | 87 | 96% | 91 | 100% |
| Age (Mean) | 44.5 |  | 46.7 |  |  |  |
| Educational attainment |  |  |  |  |  |  |
| No. schooling | 1 | 17% | 1 | 100% | 2 | 2% |
| Inc. elementary | 2 | 33% | 42 | 98% | 44 | 48% |
| Complete high school | 2 | 33% | 27 | 93% | 29 | 32% |
| Inc. high school | 1 | 13% | 7 | 88% | 8 | 9% |
| Compete high school | 0 | 0% | 7 | 100% | 7 | 8% |
| Inc.college/ vocational | 0 | 0% | 1 | 100% | 1 | 1% |
| Total | 6 | 7% | 85 | 93% | 91 | 100% |

Most of the respondents of the study were engaged in selling crabs to middlemen outside the home, and also in repairing equipment. The least of them involve in selling to consumers outside. A few women (4%), participate in a host of activities like fishing, crab meat processing inside and outside home, repair of equipment outside, selling to public market, and perform other unidentified activities.

1. **RESULTS AND DISCUSSIONS**

The presentation of the socio-economic profile includes the data on occupation, income, occasional jobs and fishers’ CPUE values.

* 1. *Occupation and income*

A great number of fishers (96% of 91) opt to work in the local government unit (LGU), or find other means of living such as enlisting in construction work, or driving pedicab in the city. The least of them find work in art job or drawing.

The peak months occurs in August and September which registers 1.25 and 1.17 CPUE values each, and the lean months in July with 0.42 CPUE value. The average CPUE is pegged at 0.76 which, at P1.20/kg, obtains an average monthly income of Php1,761.69. This value is much lower than that reported earlier in Barangay Ibol, Catbalogan, Samar at 2.32 (Racuyal et al., 2009), and in Barangay Mercedes, Catbalogan at 2.12 (Sorio, 2011). However, this current data finds support from the Philippine Bureau of Agricultural Statistics (BAS, 2015) figures showing an annual average drop of 13% on the production of the species in Samar from 2005 to 2014.

There is great reduction in the volume of the fishers’ catch from time they started fishing to its current value by -0.32%. Thus, from the range of Php 410.26 as the approximate value from current fishing activities and the CPUE-derived income of Php1,761.69, the average income of the fishers would be P1,085.98. This income is seven times lower than the poverty threshold for the country which is Php 8,022.00 (US$186.56) per month for the household (PSA, 2014).

Table 2. Type of occupation of the blue crab fishers according to gender

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No | Occupation type | Female | % | Male | % | Total | % |
| 1 | Selling to middleman outside home |  | 0% | 14 | 100% | 14 | 100% |
| 2 | Repair equipment at home |  | 0% | 12 | 100% | 12 | 100% |
| 3 | At home-selling to consumers | 1 | 2% | 54 | 98% | 55 | 100% |
| 4 | Crab meat processing at home | 3 | 3% | 86 | 97% | 89 | 100% |
| 5 | Crab meat processing inside/outside home | 4 | 4% | 87 | 96% | 91 | 100% |
| 6 | Other fishery activities outside | 4 | 4% | 87 | 96% | 91 | 100% |
| 7 | Repair equipment outside | 4 | 4% | 86 | 96% | 90 | 100% |
| 8 | Fishing | 4 | 4% | 86 | 96% | 90 | 100% |
| 9 | Selling to public market | 4 | 5% | 80 | 95% | 84 | 100% |
| 10 | Selling outside to consumer | 1 | 8% | 11 | 92% | 12 | 100% |

There is great reduction in the volume of the fishers’ catch from time they started fishing to its current value by -0.32%. Thus, from the range of Php410.26 as the approximate value from current fishing activities and the CPUE-derived income of Php1,761.69, the average income of the fishers would be P1,085.98. This income is seven times lower than the poverty threshold for the country which is Php8,022.00 (US$186.56) per month for the household (PSA, 2014).

Majority of the small scale crab fishers own their homes (90%), which are made of semi-concrete materials (40.4%). A little over than half (52%) of the respondents live in communities that are free from waste and garbage; the remaining half, however, live in unsanitary surroundings.

Only 53 of the 89 respondents (60%) showed having their own electrical connection. The rest (19%) do not have or just make series connection from their neighbors (21%).

Fishers mostly catch gravid crabs (61%) but do not take the juvenile ones (62%), and rarely use mesh net less than 3 cm (86). Generally, the small scale crab fishers use crab entangle net in catching crabs (76%) while a few use both crab pot and trawl (2% each).

* 1. *Qualitative Data from FGD and in-depth interview*

The volume of catch of the blue swimming crab had been diminishing, according to statements by the respondents. Compared to the condition 20 years ago, the fishers recalled they had more plenty of catch then, and that they could “bring more food to the table, and send more children to school in the city.” They confessed further that for couple of years the *Bantay Dagat* (or Baywatch) had not been active in apprehending violators of the fishery laws.

As an alternative livelihood, some of them resorted to land cultivation, the fishers said; others disclosed that they ventured into some small scale business (e.g. varietystore); still others admitted they decided to send their children to the big cities to look for occasional jobs that could tide over their family’s financial difficulties especially during southwest monsoons (July to September) and northeast monsoon (November-December) when the winds are very strong

Some years ago there were non-governmental organizations (NGOs) such as Wesamar, Tandaya, or the Philippine Business for Social Progress (PBSP) which provided assistance to their livelihood, the

fishers recalled. “That was before, but now, no more”, they grumbled. But with the implementation of the government’s program on conditional cash transfer (CCT), some of the respondents affirmed to have received some assistance.

Table 3. Gender-based occasional jobs during monsoons/inclement weather according

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Type of Occupation | Female | % | Male | % | Total | % |
| 1 | LGU work | 4 | 4% | 87 | 96% | 91 | 100% |
| 2 | Enlist in construction work |  | 0% | 86 | 100% | 86 | 100% |
| 3 | Drive pedicab for hire |  | 0% | 86 | 100% | 86 | 100% |
| 4 | Unemployment benefits | 4 | 4% | 86 | 96% | 90 | 100% |
| 5 | Retirement/old age benefits | 4 | 4% | 86 | 96% | 90 | 100% |
| 6 | Piggery/poultry | 4 | 4% | 86 | 96% | 90 | 100% |
| 7 | Mussel farming | 4 | 4% | 86 | 96% | 90 | 100% |
| 8 | Fish processing | 4 | 4% | 86 | 96% | 90 | 100% |
| 9 | Catch shrimp | 4 | 4% | 86 | 96% | 90 | 100% |
| 10 | Find job in city | 4 | 5% | 84 | 95% | 88 | 100% |
| 11 | Borrow from middleman | 4 | 5% | 83 | 95% | 87 | 100% |
| 12 | Processing | 4 | 5% | 80 | 95% | 84 | 100% |
| 13 | Agriculture | 3 | 4% | 79 | 96% | 82 | 100% |
| 14 | Borrow from store/friends | 4 | 5% | 79 | 95% | 83 | 100% |
| 15 | Agriculture/farming | 2 | 3% | 76 | 97% | 78 | 100% |
| 16 | Do not work at all | 1 | 3% | 36 | 97% | 37 | 100% |
| 17 | Net fixing | 1 | 4% | 22 | 96% | 23 | 100% |
| 18 | Job in the city |  | 0% | 6 | 100% | 6 | 100% |
| 19 | Occasional jobs (Unspecified) |  | 0% | 4 | 100% | 4 | 100% |
| 20 | Buy & sell goods at store |  | 0% | 4 | 100% | 4 | 100% |
| 21 | Aquaculture | 1 | 33% | 2 | 67% | 3 | 100% |
| 22 | Art job/drawing |  | 0% | 1 | 100% | 1 | 100% |

Relative to the implementation of fishery laws, particularly the zoning law, the fishers complained about its implementation—adding that it caused many problems in the marking of maritime boundaries. Also they complained about some intruder-fishers using dynamite, trawl and Danish (*pahulbot*) fishing methods—saying that these methods were still proliferating despite the law banning their usage.

When asked of their opinion on the future of the crab industry in their localities, the respondents answered with uncertainty. *Ambot daw la. (We don’t know)*; *Bahala na la!* (God will provide!).

* 1. *Role and status of women in the household*

The few women engaged in fishing, were mostly involved in post-harvest activities. They said that their income not only benefitted their household but it also helped them in improving their self-esteem.

Table 4. Monthly catch, No. of days fishing, CPUE values and monthly income

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Month | Catch(kg) | No. of Days | No. Fishers Ave. | CPUE | Monthly Income |
| Jan | 22.52 | 18 | 1.50 | 0.83 | 1,801.43 |
| Feb | 22.52 | 19 | 1.50 | 0.79 | 1,801.43 |
| Mar | 22.86 | 17 | 1.50 | 0.90 | 1,828.57 |
| Apr | 22.86 | 18 | 1.50 | 0.85 | 1,828.57 |
| May | 20.67 | 20 | 2.00 | 0.52 | 1,240.00 |
| June | 20.24 | 23 | 2.00 | 0.44 | 1,214.67 |
| July | 20.98 | 20 | 2.50 | 0.42 | 1,007.20 |
| Aug | 23.74 | 19 | 1.00 | 1.25 | 2,849.10 |
| Sept | 21.02 | 18 | 1.00 | 1.17 | 2,522.03 |
| Oct | 27.17 | 21 | 1.50 | 0.86 | 2,173.28 |
| Nov | 22.86 | 20 | 2.00 | 0.57 | 1,371.43 |
| Dec | 19.14 | 20 | 2.00 | 0.48 | 1,148.57 |
| Average | 22.21 | 19.42 | 1.67 | 0.76 | 1,761.69 |

Table 5. Volume of catch during peak season (current and when started fishing)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Catch (kg) | Std. Deviation | Approx. value @ P120/kg. | Difference % |
| When started fishing | 10.70 | 23.510 | 1,283.85 | -32% |
| Current fishing | 3.42 | 5.227 | 410.26 |  |

Table 6. Household conditions of the blue swimming crab fishers

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Educational attainment | | | | | | | Home ownership | | | | | Home electricity | | | | House type | | | | | Home location | | | | | |
|  | Illiterate | Inc. elementary | Complete high school | Inco high school | Compete high school | Inc. college/ vocational | Total | Owned | Inherited | Rented | Family | Total | Own connection | From other homes | None | Total | Concrete | Semi-Concrete | Nipa | Others | Total | Open sewer | Waste disposal area | F. processing disposal area | Other unhealthy place | No | Total |
| N | 1 | 43 | 29 | 8 | 7 | 1 | 89 | 84 | 1 | 2 | 4 | 91 | 53 | 19 | 17 | 89 | 23 | 36 | 29 | 1 | 89 | 23 | 7 | 9 | 4 | 46 | 89 |
| % | 1% | 48% | 33% | 9% | 8% | 1% | 100% | 92% | 1% | 2% | 4% | 100% | 60% | 21% | 19% | 100% | 26% | 40% | 33% | 1% | 100% | 26% | 8% | 10% | 4% | 52% | 100% |

Thus, they kept themselves busy with various household chores so that if only men went to fishing, the women would scour the forest to find wood fuel for the kitchen, or would go upland to cultivate farm crops to supplement the basic needs of the family. Some of the women interviewed chattered that if some of their peers do not get involved in fishing or vending activities, they are perceived to be conscious of their glamour roles only.

Table 7. Fishers' attitude toward blue crab conservation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | No | % | Yes | % | Total | % |
| Catching gravid crabs | 34 | 39% | 54 | 61% | 88 | 100% |
| Catching juvenile crabs | 54 | 62% | 33 | 38% | 87 | 100% |
| Using net less than 3 cm. | 72 | 86% | 12 | 14% | 84 | 100% |

Table 8. Buying pattern of crab consumers, dealers, middlemen, crabmeat processors

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Nature/ role of business | Buy gravid | | | | | | Buy juvenile | | | | | |
| *No* | *%* | *Yes* | *%* | Total | *%* | *No* | *%* | *Yes* | *%* | Total | *%* |
| Consumers | 19 | 22 | 68 | 78 | 87 | 100 | 49 | 57 | 37 | 43 | 86 | 100% |
| Middlemen | 7 | 54 | 6 | 46 | 13 | 100 | 11 | 85 | 2 | 15 | 13 | 100% |
| Dealers | 2 | 17 | 10 | 83 | 12 | 100 | 6 | 55 | 5 | 45 | 11 | 100% |
| Processors | 1 | 33 | 2 | 67 | 3 | 100 | 2 | 67 | 1 | 33 | 3 | 100% |
| Total | 29 | 25 | 86 | 75 | 115 | 100 | 68 | 60 | 45 | 40 | 113 | 100% |

Table 9. Types of fishing gears used by the small scale crab fishers

|  |  |  |
| --- | --- | --- |
|  | N | % |
| Crab entanglenet/gillnet (*Pukot-panmasag*) | 41 | 76% |
| Crab liftnet (*Bintol*) | 11 | 20% |
| Crab pot (*Timing/panggal*) | 1 | 2% |
| Trawl (*Galadgad*) | 1 | 2% |
| Total | 54 | 100% |

The artisanal crab fishers’ monthly income that is seven times lower than the Philippine poverty threshold is a grave socio-economic concern. Several factors affecting this problem may include the following: their traditional methods of fishing and vending, the capture of gravid and immature crabs, the impact of deteriorating and unsanitary environment, the occurrence of tropical storms and inclement weather, the exploitative fishing industry structure, and the fishers’ low educational attainment.

The traditional fishing methods could only yield little harvest and they were considered ecologically and economically unsustainable. This is evidenced by the production of only one metric ton of blue swimming crabs in Samar in 2014 (BAS, 2015), which amounts to 95% reduction from the 1983 level (Villoso and Hermosa, 1983).The capture of gravid and immature crabs is harmful to the ecosystem (Ingles and Flores, 2000, p. 51) because it reduces the capacity of the species to reproduce and repopulate, thus affecting the earth’s biodiversity that is vital in supporting life and human economy (Miller and Spoolman, 2013; p. 5). The blue swimming crab, being part of this biodiversity is evidently suffering from this abnormal ecological disturbance which is anthropogenic and contributes to the “tragedy of the commons” (Hardin, 1968). In a related vein, ecological imbalance affects climate change as well as the occurrence of tropical cyclones or typhoons (WMO-IWTC, 2006).Further, the occupation of crabbing is part of a complex web of relationships between the gatherers and suppliers on the one hand, and the consumers, dealers, crab meat processors and middlemen on the other. By preferring to buy, trade, and process gravid crabs, they show their ignorance and unmindfulness of this species’ impending depletion. For one reason—the high price that this product commands in the United States (Pramod, Nakamura, Pitcher & Delagran, 2014; p.103) motivates local fishers to catch the species either through legal or illegal methods.

The women view themselves more as supporters than leaders, in the household, though they fell proud of the success of those they have assisted (Siason, 2004; p. 145). Like their domestic partners who only have attained low level of education, they could not influence much to change the condition in the crab fishery.

1. **CONCLUSIONS**

Socio-economic and attitudinal factors not only of the crab fishers but also of the other stakeholders of the blue crab industry, coupled with deteriorating environmental conditions, affect the indigence of the blue crab fishers. Likewise, lack of socio-economic support and of education deprive the women in sharing equal leadership and decision-making roles in the fishing household.

**LIMITATIONS OF THE STUDY**

The number of sample respondents did not statistically represent the whole population of the fishers, consumers, dealers and middlemen in Catbalogan City or in Samar Island. Absentee fisher-respondents may have resorted to other kinds of occupations or migrated to other regions for economic motives. Thus, a larger sample from the locale may be necessary to add more substance to the data. Further, some of the data on crab catch by fishers were not based on actual counting in the sites, but were reported as estimates by them.

**ACKNOWLEDGEMENT**

The researchers would like to thank the management of the Samar State University for its support for the project. We would like to particularly acknowledge Dr.Felisa E. Gomba (VP for RDE), Dr.Ronald Orale (Director for R&E) for their support, and Dr.Florabelle Patosa (Dean of CAS), and Dr.Lolito Amparado (Dean of COFMAS) for their encouragement.

**REFERENCES**

Aaheim HA. & Sygna L. (2000). Economic Impacts of Climate Change on Tuna Fisheries in Fiji Islands and Kiribati (Cent for Intl Clim Environ Res, Oslo). Rept. 2000;2000:4.

American Psychological Association (APA). (2015). Retrieved July 7, 2015 from <http://www.apa.org/topics/> socioeconomic-status/.

Anand, T. & P. Soundarapandian. (2004).Sea ranching of commercially important blue swimming crab *Portunus pelagicus (Linnaeus, 1758)* in Parangipettai Coast. *International Journal of Sciences and Nature*, Vol. 2(2) 2011: 215-219. ISSN 2229-6441

Arcales, J. (2011). *Profiling of the crab meat processing industry in Catbalogan, Samar*. Unpublished undergraduate thesis. Catbalogan City, Philippines: Samar State University.

Batoy CB, B.C. Pilapi, JF Sarmago (1988). *Contributions to the biology and ecology of the blue crab*. Leyte Visca, Baybay, Leyte: Leyte State University.

Bureau of Agricultural Statistics (BAS, 2014). [www.bas.gov.ph](http://www.bas.gov.ph).

Baylon, J.C. (2007). *Appropriate food type, prey density and stocking density in the larval rearing of the blue crab*, *Portunus pelagicus* L. Miagao, Iloilo, Philippines: University of the Philippines—Visayas.

Brander, K.M. (2007). Global fish production and climate change. *Proceedings of the National Academy of Sciences of the United States. Proc Natl Acad Sci U S A. 2007 Dec 11; 104(50): 19709–19714. doi: 10.1073/pnas.0702059104. retrieved July 8, 2015 from* [*http://www.ncbi.nlm.nih.gov/*](http://www.ncbi.nlm.nih.gov/) *pmc/ articles/ PMC2148362/.*

Campos--Del Norte AGC. & KA. Villarta. (2004). *Catch and catch rates of the BSC in various fishing grounds in Panay*. Miag-ao, Iloilo. University of the Philippines—Visayas.

Campos--Del Norte AGC.& KA. Villarta. (2008). *Population biology of the portunid crabs* *Portunus pelagicus* (Linnaeus, 1758) and *Charybids feriatus* (Linnaeus, 1758) in Pilar and Capiz Bays, Northern Panay, Philippines.

Daw TM, JE Cinner, TR McClanahan, K Brown, SM Stead, NAJ Graham & J Maina. (2012). To fish or not to fish: Factors at multiple scales affecting artisanal fishers’readiness to exit a declining fishery. In *PLoS One. 2012; 7(2): e31460*. Bethesda, MD, 20894, USA: National Center for Biotechnology Information. DOI: 10.1371/journal.pone.0031460. Retrieved July 8, 2015 from <http://www.ncbi.nlm.nih.gov/pmc/> articles/PMC3277441/

Department of Agriculture—Bureau of Fisheries and Aquatic Resources (DA-BFAR). *Philippine blue swimming crab management plan*. (2010) Unpublished research. Bureau of Fisheries and Aquatic Resources, Philippine Department of Agriculture.

Department of Agriculture—DA (2014). List of fisherfolks in Catbalogan. City Agriculturist Office.

De Vera, Ellalyn. (2013). Manila Bulletin. Retrieved March 4, 2016 from <http://www.mb.com.ph/20-cyclones-visit-ph-annually/>. November 7, 2013.

Food and Agriculture Organization of the United Nations-(FAO-UN, 2006). Building Adaptive Capacity to Climate Change: Policies to Sustain Livelihoods and Fisheries. No 8. Rome: FAO; 2006. New Directions in Fisheries, A Series of Policy Briefs on Development Issues.

Germano BP, JLF Melgo. (2003). *Population, reproductive and fishery biology of the blue crab, Portunus pelagicus, in Leyte and Samar, and management implications*. Visca, Baybay, Leyte: Leyte State University.

Green SJ, JO Flores, JQ Dizon-Corrales, RT Martinez, DRM Nunal, NB Armada, AT White. (2004). *The Fisheries of Central Visayas, Philippines: Status and Trends*. Philippine Department of Agriculture—Bureau of Fisheries and Aquatic Resources (Region 7), in collaboration with Philippine Deparmtnet of Environemtn and Natural Resources (Region 7).

Hardin, G. (1968). The tragedy of the commons. *Science Vol. 162, pp. 1243-1248.*

Ingles, JA (1988). Management strategies for *Portunus pelagicus* fishery in Ragay Gulf, Philippines. Fisheries Research Journal Philippes Vol 13 (1-2), 15-22.

Ingles, J. and J. Flores. (2000). Address ecological impact of fishing gears: A case study of the blue crab fishery of Guimaras Strait and Visayan Sea, Philippines, p. 382-387. *In* T. Arimoto (Ed.) Proceedings of the Thrid Japan Society fot the Promotion of Science-DGHE International Symposium on Fisheries Science in Tropical Areas, Bogor, Indonesia.. Pp.47-52.

Josileen, J. (2011). Food and feeding of the blue swimmer crab, *Portunus pelagicus* (Linnaeus, 1758) along the coast of Mamdapam, Tamil Nadu, India. *Crustaceana* 84 (10): 1169-1180. DOI: 10.1163/001121611X590111.

Kalikoski, DC & M Vasconcellos (2012). “Case study of the technical, socio-economic and environmental conditions of small-scale fisheries in the esturary of Patos Lagoon, Brazil: A methodology for assessment”. *FAO Fisheries and Aquaculture Circular No. 1075.*Rome: Food and Agriculture Organization of the United Nations. ISSN 2070-6065.190 pp. Retrieved from [www.fao.org/icatalog/inter-e.htm](http://www.fao.org/icatalog/inter-e.htm). March 1, 2013.

Mehanna S.F., S. Khvorov, M. Al-Sinawy, Y.S. Al-Nadabi & M.N. Al-Mosharafi. (2013). Stock assessment of the blue swimmer crab *Portunus pelagicus* (Linnaeaus, 1766) from Oman Coastal Waters. *International Journal of Fisheries and Aquatic Sciences* 2(1): 1-8.P.O. Box 427, Muscat, Oman. Marine Science and Fisheries Centre. ISSN:2049-8411; e-ISSN: 2049-842X.

Miller Jr., G Tyler & Scott Spoolman. (2013). *Principles of Environmental Science*. Singapore: Cengage Learning Asia Pte, Ltd. ISBN-13:978-1-285-88329-8.

Philippine Statistics Authority-(PSA, 2014) Retrieved from .http://www.gov.ph/2014/04/29/ psa-poverty-incidence-among-filipinos-registered-at-24-9-as-of-first-semester-of-2013/

Pauly, D. (2006). Major trends in small-scale marine fisheries, with emphasis on developing countries, and some implications for the social sciences. *Maritime Studies*. 2006;4:7–22.

Pramod G, K. Nakamura, TJ Pitcher, L. Delagran. (2014). Estimates of illegal and unreported fish in seafood imports to the USA. *Marine Policy 48 (2014) 102-113.* Elsevier Ltd. (<http://creativecommons.org/license/by-nc-nd/3.0>).

PRIMEX-ANZDEC. (1996). *Fisheries sector development project*. ADB-TA 2236-PHI *Draft Final Report. Fisheries Sector Program*, Department of Agriculture, Quezon City, Philippines.

Racuyal, JT, PS Cabrales, FB Patosa (2009). *Small-scale fisheries of the blue swimming crab (Portunus pelagicus) in Maqueda Bay*. Samar State University Research and Graduate Journal Vol. 5. ISSN 1908-6806., p. 6-25.

Sorio, J. (2011). *Length-weight relationship of blue swimming crab* (*Portunuspelagicus*). Unpublished undergraduate thesis.College of Fisheries and Marine Sciences.Samar State University.Catbalogan City.

Siason, I.M. (2004). Women in Fisheries in the Philippines. *In turbulent seas: the status of Philippine marine fisheries.*pp.144-149. Department of Agriculture—Bureau of Fisheries and Aquatic Resources. Coastal Resource Management Project. Cebu City, Philippines. CRMP Document No: 02-CRM/2004. ISBN: 971-92753-4-0.

Siason, I.M. (2013). Women and Gender and Development in Coastal resource management. In *Coastal Resources Management: Perspective from the Social sciences* (p. 203-235). Miag-ao, Iloilo, Philippines: University of the Philippine—Visayas.

Svane I, & G. Hooper. (2004). Blue swimmer crab fishery. Fishery assessment report to PIRSA for the Blue crab fishery management committee. *South Australian Research and Development Institute (*Aquatic Sciences), Adelaide, RDO3/0274-2.

Villoso EP & GV Hermosa, Jr. (1983). *Demersal fish resources of Samar Sea and Carigara Bay*, Philippines. Diliman, Quezon City: Department of Marine Fisheries, College of Fisheries, University of the Philippines—Visayas.

Warfel HE & Manacop PR. (1950). Otter trawl explorations in Philippine waters. *Research Reports 25, Fish and Wildlife Services*. Washington, D.C.: Fish and Wildlife Services, US Department of Interior.

World Bank (2012). *Evaluation of new fishery performance indicators (FPIs): A case study of the blue swimming crab fisheries in Indonesia and Philippines*. Washington, D.C., U.S.A.: International Bank for Reconstruction and Development. [www.worldbank.org](http://www.worldbank.org).

WMO-International Workshop on Tropical Cyclones (2006). Proceedings from IWTC-6, San Jose, Costa Rica. Retrieved March 4, 2013 from [https://www.wmo.int/ pages/prog/arep/ tmrp/documents/ iwtc\_statement.pdf](https://www.wmo.int/%20pages/prog/arep/%20tmrp/documents/%20iwtc_statement.pdf)

Zainal, Khadija AY.(2013). Natural food and feeding of the commercial blue swimming crab, *Portunus pelagicus* (Linnaeus, 1758) along the coast water of the Kingdom of Bahrain. *Journal of the Association of Arab Universities for Basic and Applied Sciences* (2013)*.* 13, 1-7. University of Bahrain. [http://dx.doi.org/10.1016/j.jaubas. 2012.09.002](http://dx.doi.org/10.1016/j.jaubas.%202012.09.002).