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Blue swimming crab (*Portunus pelagicus*) catch and effort amid COVID-19 pandemic: Perspective of crabbers in the Islands of San Miguel and Cagraray, Albay, Philippines

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Abstract

Crabbing is considered one of the essential sources of livelihood in the province of Albay keeping their traditional way of surviving life especially during pandemic. The study was conducted during the time of COVID-19 pandemic in the islands of San Miguel and Cagraray, Albay which highlighted the perspective of crabbers on catch and effort of blue swimming crab (*Portunus pelagicus*). There are three (3) fishing gear types identified used by small scale crab fishers consist of bottom set gill net (BSGN), crab pot, and crab lift net. Results showed fifty-one (51) unit gear types for crabbing, thirty-three (33) of which comes from San Miguel Island, while in Cagraray Island, there were eighteen (18)

fishing gear units identified. The average catch ranges from 0.2 kilograms to 4 kilograms per fishing trip, noticing smaller sizes of catch than the previous years. These observations could be related to the increasing number of gears and crabbers in the area resulting to competition for the resources and high fishing pressure. The estimated annual production for bottom set gillnets, crab pots, and crab lift nets are 6.5 mt, 6.9 mt and 1.5 mt., respectively. Moreover, the estimated annual production for blue swimming crabs is 8.78 mt in the islands. Further studies on the population biology of *Portunus pelagicus* in the area is recommended for specific management strategies.

Keywords: livelihood, pandemic, production, crabbers

Introduction

A novel coronavirus infection known as COVID-19 proliferated worldwide including in the Philippines which affected both the social and economic aspect of the country (Bennett *et al.*, 2020). Covid-19 transmission started in the Philippines in the year 2020 which compel the government to impose community quarantines, lockdowns, travel restrictions, etc. as measures to limit the spread of the virus (Olanday, 2020) ^[10] hence, resulting also to significant losses in income and employment (The World Bank, 2021) ^[16]. In Bicol region, Lagonoy Gulf, bounded by the provinces of Albay, Camarines Sur and Catanduanes, is considered one of the largest and most productive gulfs providing substantial livelihood and income to the fishers and community particularly in San Miguel and Cagraray Island (Olaño *et al.*, 2017). Characterized as a multi-species and multi-gear fishery, the annual production estimate in the gulf is 37, 012 metric tons (mt) contributed by fishing gear used such as hook and line, surrounding net, gillnet, and minor gears including crab pot/trap and lift net (Olaño *et al.*, 2009) ^[12]. However, due to habitat degradation and illegal fishing activities, catch over time are observed to be declining and thus, affecting the livelihood of the community (Olaño *et al.*, 2017).

Blue swimming crab (*Portunus pelagicus*) locally known as “kasag” is a commercially important invertebrate in the Philippines which ranked third worldwide and second among Southeast Asian countries in terms of production. According to the Bureau of Agricultural Statistics, the country produced 29,272 metric tons of blue swimming crab in 2011, valued at P1.85 billion, which is also a major export commodity for the country, meeting 9.53 percent of the demand for crab meat in the United States of America (Corpuz and Mananghaya, 2017) ^[2]. In Bicol region, production of blue swimming crabs in the year 2019 is 5,524.07 mt, wherein the province of Albay shares about 5.45% from the regional production (PSA, 2020) ^[13].

San Miguel and Cagraray Islands in Albay province are located at the southern part of Lagonoy Gulf which also have rich diversity of coastal resources and habitats (Rivero *et al.*, 2010) ^[14]. The islands' economy are primarily based on capture fisheries, as evidenced by the dominant catch composition of reef fishes and invertebrates particularly blue swimming crabs (Soliman *et al.*, 1997) ^[15]. Crab fishing is considered one of the essential sources of livelihood in the islands to keep their traditional way of surviving life. The crab production in the area is usually generated by small scale fishers wherein their fishing activities vary depending on the seasonality of the species.

It is vital to determine the present status of blue swimming crabs especially in the time of covid-19 pandemic, considering its importance and contribution to the community livelihood. Moreover, the perception and knowledge of fishers in the community are critical components of improving fisheries management (Macale and Nieves, 2019) [6]. Thus, this study highlighted the perspective of the crabbers on blue swimming crab (*Portunus pelagicus*) catch and effort during the time of COVID-19 pandemic in the islands of San Miguel and Cagraray, Albay, Philippines.

Materials and Method

Study Area

Lagonoy Gulf is located at the eastern part of Bicol region along the pacific coast between 13.583° N latitude and 123.75° E longitude. The study was conducted last January 2021 along the barangays of San Miguel Island (Rawis, Sagurong, and Malictay) and Cagraray Island (Tambilagao) where most of the crabbers are located. San Miguel Island has a total area of 44.08 km² and is situated off the east coast of Tabaco Bay and south of Lagonoy Gulf (Rivero *et al.*, 2010) [14]. While Cagraray Island has a land area of 122.12 km² and located also south of Lagonoy Gulf next to San Miguel Island.

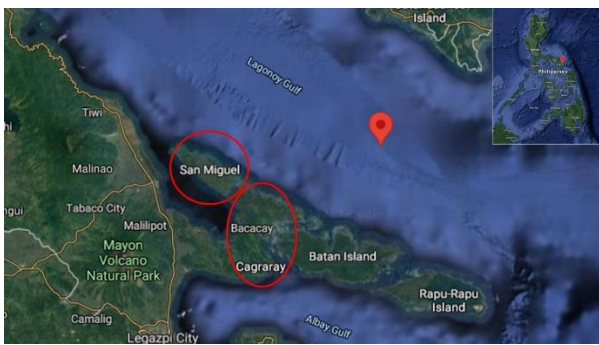


Fig 1: Map showing the San Miguel and Cagraray Islands of Lagonoy Gulf, Philippines

Catch and Effort

Catch and effort data were obtained from the thirty (30) identified key informants who are directly involved in crab fishing with 10-45 years of experience. Actual observation

and interviews with the respondents were done with an interview guide to collect data information particularly on the fishing gear used, catch composition, catch rate (kg./trip), catch per unit effort (CPUE), and estimated production. Related secondary data from the Office of the Barangay and Barangay Fisheries and Aquatic Resources Management Council (BFARMC) were also requested for validation purposes.

The estimated production was derived from the formula (Macale *et al.*, 2020) [5]:

Estimated Production= catch rate x fishing frequency x no. of gear units

On the other hand, the data for CPUE was analyzed based on the formula computation of De la Cruz *et al.* (2015) study:

1. Gillnets were standardized at 50 m segment¹ and an average of 12-hour soaking time.

$$\text{Gillnets CPUE} = \frac{\text{Total daily catch (kg)}}{\text{Total no. of segments}}$$

2. Mean soaking time for crab pot is 10 hours.

$$\text{Crab Pots CPUE} = \frac{\text{Total daily catch (kg)}}{\text{Total no. of pots}}$$

3. Mean soaking time for crab lift net is 5 hours.

$$\text{Lift nets CPUE} = \frac{\text{Total daily catch (kg)}}{\text{Total no. of lift nets}}$$

Results and Discussion

Fishing Gear Used

Majority of crab production in San Miguel and Cagraray Islands are usually generated by small scale fishers whose practices varied depending on the fishing seasonality. A total of fifty-one (51) gear units for crabs were estimated in the study area. Thirty-three (33) of which comes from San Miguel Island comprising two (2) bottom set gillnet, six (6) crab lift nets and twenty-five (25) crab pots. While in Cagraray Island, there were eighteen (18) fishing gear units of which sixteen (16) were bottom set gillnet and two (2) crab pot gears, as shown in the Table 1.

Table 1: Type and Number of Gear Units for Crabbing

Location	Bottom set gill net (BSGN)	Crab pot (CP)	Crab lift net (CLN)	Total
1. San Miguel Island	2	25	6	33
2. Cagraray Island	16	2		18
Total	18	27	6	51

Bottom set gillnet (BSGN) is a traditional gear commonly used in Cagraray Island. The gear consists of several panels of nylon, polyamide or “kuralon” nettings with different mesh sizes. It measures 100 to 1000 meters of length consisting of 2 to 20 segments locally known as “banata”. In some fishing areas in the Philippines, the length of the gear measures the same to as high as 30 segments with a total of 3,000-to-6,000-meter length (De la Cruz, 2015). This gear is operated for an about 12 hours by soaking and hauling the gear either during morning or afternoon at the crabbing site.



Fig 2: Bottom set gill net (BSGN) used by crabbers in San Miguel and Cagraray Islands.

Crab pot (CP) on the other hand is commonly gear used in San Miguel Island. The gear set consist of about 30 unit of pots made of matted bamboo strips forming a dome-shape trap with a non-returning valve. The setting operation varies according to location, water depth, and the number of pots used. The soaking time of gear usually started between 4:00 to 5:00 in the morning while the hauling process begins at 2:00 to 3:00 in the afternoon. In the evening, soaking time of gear started at around 5:00 in the afternoon while the hauling process begun at 3:00 to 4:00 in the morning, which consist of 10 hours soaking time of gear. Most crabbers prefer daytime crabbing to avoid intrusion of the gear during night-time. The crabbers deployed the gear on the fishing ground approximately to 2 meters up to 3 meters' deep with low water current. The commonly used baits are trash fish and/or rabbit fish locally known as “*bataway*”.



Fig 3: Crab pots (CP) design in San Miguel and Cagraray Islands.

Crab lift net (CLN) gears were recorded used in San Miguel Island because of convenience to use, less-time operation and inexpensive maintenance according to the crabbers. They use about 10 units crab lift net with square-shaped made of monofilament polyamide netting supported by two bamboo slats or polyethylene rope arched across the opposite side of the frame. It is attached to a long rope with 5 meters to 10 meters long and improvised *buoy*. It is mostly used by a single crabber in the area. The baits hang from the intersection of the bamboo slat or the polyethylene rope for the arches just above the net. The 5-hour gear operation usually started by soaking at 5:00 am to deploy in the target fishing site, while the hauling process begins at 10:00 am. While during the afternoon operation, it begins 1:00 pm until 6:00 pm in the evening. The soaked gear is being monitored by the crabbers every 10 to 20 minutes during the operation. They gears are being deployed to approximately 2 meters deep level using baits, trash fish and “*bataway*”.



Fig 4: Crab lift nets in San Miguel Island

Catch Composition

The catch composition of BSGN in San Miguel and Cagraray Islands revealed 40%-50% blue swimming crabs and 50%-60% by-catch species composed of big-eyed scads, rabbit fish, mackerel scads, threadfin breems, Indian mackerel and croaker. While, the CP gear resulted to a catch composition of 60% blue swimming crabs and 40% by-catch (shrimp, prawn and lobster) for both islands. The catch composition of CLN showed much lesser by-catch (3%- shrimp and rabbitfish) than the target species, blue swimming crab (97%).

Catch Effort and Estimated Production

The fishing operation varies monthly depending on the seasonality. Peak season for blue swimming crabs occur during the months of March to August with the southwest (*habagat*) monsoon, while the lean season, September to December, coincide with the northeast (*amihan*) season. Moreover, the number of crab fishing operations for peak and lean seasons are 21-23 days and 9-14 days, respectively. BSGN catch rate ranges from 0.4 kg/trip to 4.0 kg/trip depending on the seasonality. During the peak season, BSGN CPUE ranges from 0.051 to 0.17 kilogram/segment/hour, whereas the lean season CPUE is 0.011-0.015 kilogram/segment/hour. In addition, CLN recorded a catch rate of 0.3-3.0 kg/trip, with the CPUE values ranging from 0.006 kg/lift net unit/hour to 0.06 kg/lift net unit/hour. Recorded catch for CLN is quite lower compared to CLN catch rate of 6 kg/trip in Sorsogon Bay (Nieves *et al.*, 2013) [6]. Furthermore, CP catch rates and CPUE ranges from 0.4 kg/trip to 2.75 kg/trip and 0.009 kg/pot unit/hour to 0.001 kg/pot unit/hour.

Key informants' observations for the past years revealed a dwindling population status of blue swimming crab in terms of catch size and production. As of today, the average catch ranges from 0.2 kilograms to 4 kilograms per fishing trip, noticing smaller sizes of catch than the previous years. In fact, crabbers' estimated size of catch ranges from 6 cm to 10 cm in the islands, which is quite lower compared with the maturity size of blue swimming crabs of 10.56 cm (females) and 9.64 cm (males) (Ingles and Braum 1998) [4]. These observations could be related to the increasing number of gears and crabbers in the area resulting to a more competition for the resources and high fishing pressure.

The estimated annual production for bottom set gillnets, crab pots, and crab lift nets are 6.5 mt, 6.9 mt and 1.5 mt., respectively. Calculating based on the catch composition (%) and gear production, the estimated annual production for blue swimming crabs is 8.78 mt in the islands.

Conclusion and Recommendation

Amid the COVID-19 pandemic, the “new normal” is still the normal condition of the blue swimming crabs in the area. High fishing pressure resulting to declining size and catch that could also result to overfishing is still affecting the fishers particularly the crabbers. Take note that crab fishing is still a significant livelihood, these resources still contribute to the community for their daily lives especially in the time of pandemic. Hence, it is relevant to manage the resources for its sustainability based on the existing national policy. It is also recommended to conduct a further study on the population parameters and biology of blue swimming crabs in the area for more baseline information relative to specific management strategies.

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