

Impact of COVID 19 on the Production of Sardines in Bulan, Sorsogon, Southern Luzon, Philippines

Antonino B. Mendoza, Jr. ^{a*} and Plutomeo M. Nieves ^a

^a Bicol University Tabaco Campus, Tabaco City, Albay, Philippines.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJEBA/2022/v22i830584

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc. are available here: <https://www.sdiarticle5.com/review-history/84602>

Original Research Article

Received 19 February 2022

Accepted 25 March 2022

Published 28 March 2022

ABSTRACT

Sardine fishery is a multimillion industry in Bulan, Sorsogon. It provides opportunity of the smallholders catching fish but also through various interventions across supply chain that include boat and net repairman, traders, brokers, wholesalers, retailers and labors, transportation, processing and canning. The study recorded that sardine's production in Bulan, Sorsogon was not significantly affected by COVID 19 pandemics with a monthly average production of 16mt and an estimated annual production of 1,887mt but this had reduced income of small-scale sardine fishermen and operators around 40%. Income reduction was attributed mostly to strict implementation of movement and mass gatherings. The research team also identified that limited transport mechanism to local markets and Metro Manila and suburbs along with the social distancing contributed much to the drop of farm gate price of sardine. It was estimated that PhP 11M lost occurred to the total annual income of sardine fishers and operators due to the pandemic.

Keywords: Pandemic; fishery economics; sardine fishery.

1. INTRODUCTION

Sardine fishery is an important economic activity in the Philippines comprising 17.4% of the total volume of all fisheries (commercial and

municipal), with an average of 330,945.88MT with a total amount of PhP 9,466,007,060.00 [1]. This would mean that sardine fishery (*Sardinella fimbriata* and *Sardinella lemuru*) contribute country's food security through its primary role as

*Corresponding author: E-mail: antox2002@yahoo.com, antox.mendoza@gmail.com;

a main source of income used to buy other important foods of Filipinos as fishers, transport and labor, processors, ice plants operators and others.

In terms of sardine production, Bicol Region ranked 1st with 40% contribution to the sardine fisheries nationwide with region 9 (Zamboanga Peninsula) following with 14% production share [1]. However, Zamboanga Peninsula ranked 1 for *S. lemuru* followed by Bicol Region.

According to PSA [1], Sorsogon province is the highest contributor to Bicol sardines' production with 67% in average which can be translated to 27% share to the national production amounting to an average value of PhP 333,962,146.7.

However, with the start of Covid 19 pandemic and adopting quarantine measures, all activities including fishing were affected due to restriction on movements and mass gatherings. This led to reduced production from fishing and related activities including catching trading and processing. Thus, the economy of the country was affected due to the movement restriction from both fish supplies and production [2].

The pandemic had affected livelihood, prohibited usual fishing operations and decreased sustainable catch for consumption [3]. It affected subsistence fishers provide their family's essential needs [4, 2].

Although Covid-19 has done us considerable economic and social harm, now we need to adopt and implement effective plans and programs for our survival. However, for proper planning, it is essential to understand for the policy makers and researcher what actually happened to the sardine fish production in Bulan, Sorsogon, Philippines due to the restrictions imposed during Covid emergency. Hence, the study was undertaken.

2. METHODOLOGY

Municipality of Bulan in the Province of Sorsogon, Philippines (Fig. 1) is located at the southernmost portion of Luzon Island which is one of the major fish landing areas in Bicol Region with reference to sardines' fishery. Bulan, Sorsogon, Philippines is a strategic place for sardine landing point due to its proximity to other sardine fishing areas such as Samar-Leyte and

Masbate Provinces including Ticao and Burias Islands. Aside from that there are presences of facilities such as storage areas, ice plants, fish port and good access roads.

This paper used primary and secondary data available to determine possible effects of COVID 19 to the total production of sardine fishery in Bulan, Sorsogon to semi-quantitatively estimate economic impacts of community quarantines because of the pandemics.

Primary data were from the monthly catch and effort data collection on the catches of selected fishers from Bulan Sorsogon. Ten (10) fishing vessels were monitored in terms of their daily catches. From these monitored fishing vessels, total production of the municipality was estimated by determining their average fish catch multiplied by the number of all fishing gears used to catch sardines in the municipality. Then, this average volume of catch was multiplied to the average price of sardines to determine its average annual value.

The following formula were used to determine:

Total catch,

$$(1) \text{ Total catch} = \text{catch rate} \times \text{fishing frequency} \times \text{no. gear units}$$

Total value of catch,

$$(2) \text{ Estimated total value of catch} = \text{total catch} \times \text{average price}$$

Amount lost due to COVID,

While possible effect of COVID to the income of fishers and operators was computed by the average answers of the respondents' perception on the percent loss due to COVID pandemics.

$$(3) \text{ Estimated monthly amount lost due to COVID} = \text{total value of sardine per month} \times \text{perceived percentage loss}$$

then, the estimated income during COVID was computed by,

$$(4) \text{ Estimated income during COVID} = \text{total value of production per month} - \text{monthly amount lost during to COVID}$$

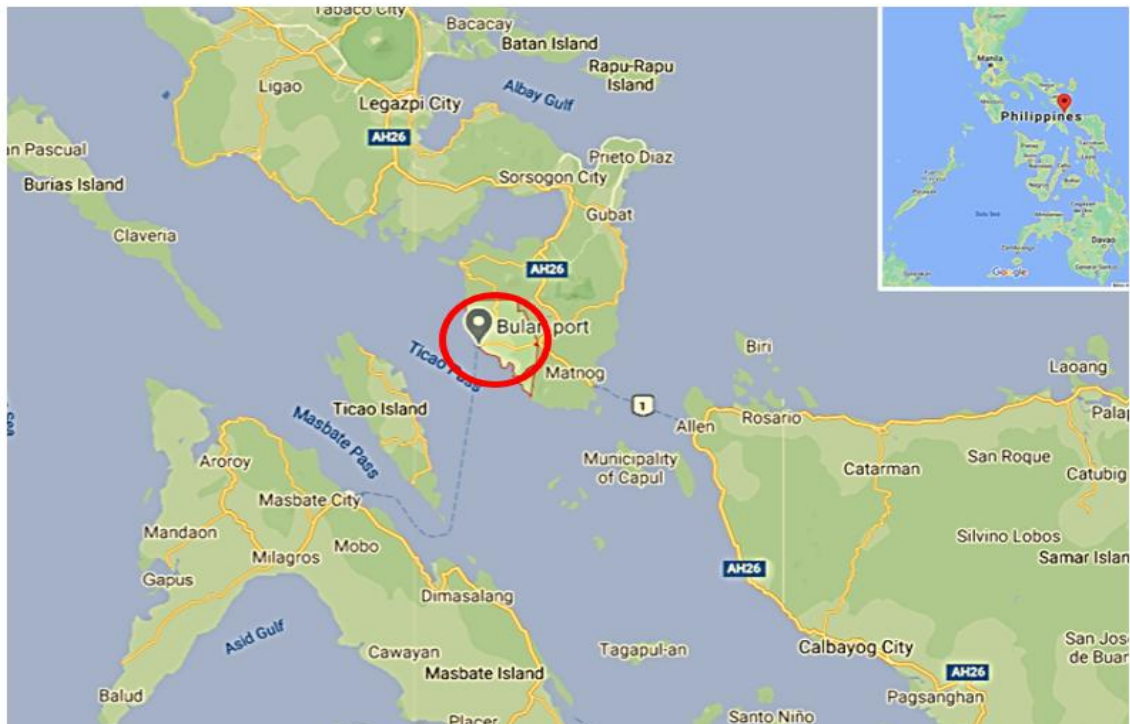


Fig. 1. Map of Philippines showing the location of Bulan, Sorsogon

Interviews were also done after the suspension of Enhanced Community Quarantine (ECQ) implementation to the sardine fishers to supplement the information on monthly catch. Twenty sardines' operators and fishers were interviewed via phone calls and face to face interviews. The interview focused on the problems encountered of the operators and fishers during the quarantine. It also involved estimates on income loss during the ECQ and possible positive impact to ecosystem due to fishing and other fishing activity restrictions.

Secondary data were collected from the Philippine Statistics Authority publications and from the available records from the Bulan Fish Port Complex.

In determining the changes in sardine's production before, during and after COVID 19 pandemic ECQ, specific months were identified to cover above-mentioned regimes. Thus, January to March were identified as before COVID, while April to June as the during COVID and July to December as after COVID.

3. RESULTS AND DISCUSSION

Sardine fishery is a multimillion industry in Bulan, Sorsogon. It involved a lot of actors in each point

in the value chain – from fishers, boat and net repairman, traders which include brokers wholesalers and retailers and labors that may include other service providers, and processors in small scale and canneries.

This paper focused only on the sardines' production from catches of the dominant fishing gears locally known as *largarete* (Drift Gill Net), and factors and impact of COVID 19 on sardines' fishery production.

Focus group discussion (FGD) in the municipality reveals that there are about 300 units of *largarete* in the area representing 60% of the total fishing gears. Monthly production of sardines in Bulan, Sorsogon is shown in Fig. 2. The graph is divided into three regimes that is, before, during and after COVID 19 ECQ. BEFORE COVID ECQ are the months covering January to March 2021 – these are the months before the outbreak of COVID in the Philippines, DURING COVID ECQ are the months from April to June where ECQ were imposed in entire Luzon and movements were strictly restricted, while AFTER COVID ECQ were the remaining months (July to December) where ECQ were downgraded to Modified ECQ (MECQ) and General CQ (GCQ), where movements restrictions were generally lenient.

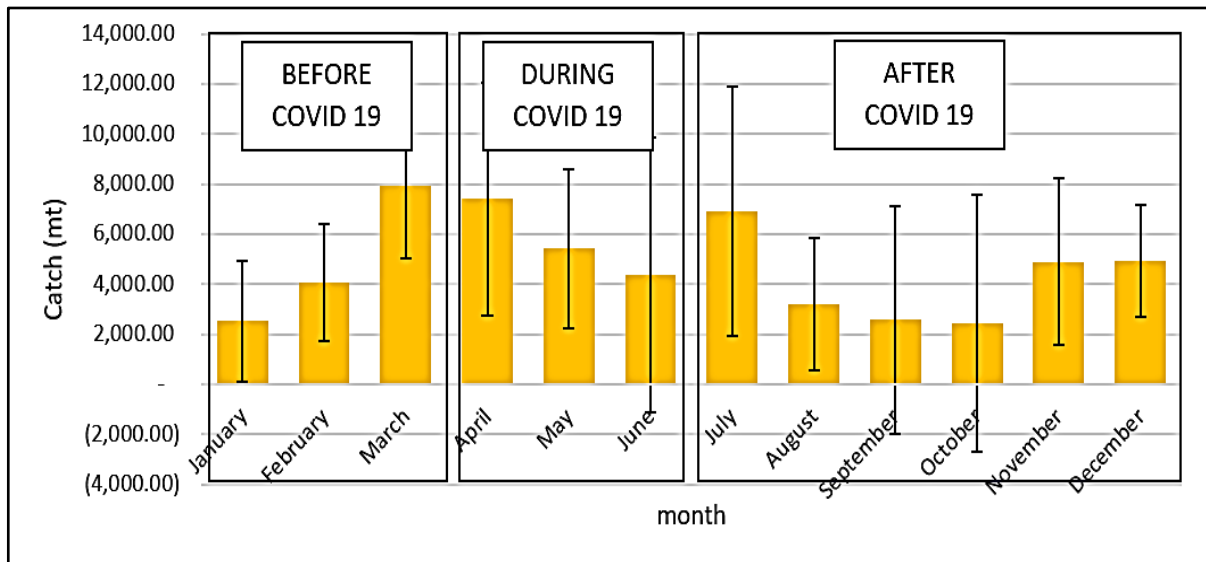


Fig. 2. Average catch of sardines by largetete in Bulan Sorsogon, before, during and after COVID 19 strict implementation of travel restrictions

It was noticed that the first quarter, that also represent the before COVID ECQ time, followed the increasing trend of sardine production in the Philippines (as can be seen in all PSA records). However, with the advent of COVID 19, during the periods April to June, its production slightly dropped in contrast to the high production in the month of July. During the normal periods (without COVID), increasing production can be generally observed from 1st to 2nd quarter, and declined in the 3rd quarter then rise again in the 4th quarter. This state coincides with the high productivity due to presence of high chlorophyll in the seawater [5,6]. In the study by Villanoy, et al., [7], model showed the preference of sardine's spawning is during periods where higher chlorophyll and lower SST are present, which corresponds to the actual observed spawning periods for the *S. lemuru* - November to February, or the northeast monsoon season, when upwelling happens. This was complimented by Dalzell et al., [8] and Willete et al., [9] that peak of sardines' production is during these months, where mechanism for upwelling off the northwest coast of Luzon and east of Mindanao is wind stress curl with the intensity of these upwelling zones tied to the alternating northeast and southwest monsoons [10]. Furthermore, elevated chlorophyll concentrations were found in the center of the identified upwelling regions and corroborate suggestions of higher primary productivity than in surrounding waters [10]. On the other hand, Aripin and Showers [11] have noticed two peaks of sardines in the Philippines which also coincided with the

alternating northeast and southwest monsoons [10, 7].

Matrices of interviews with the fisher-cooperators and other personnel in Bulan Fishport Complex showed that production of sardines did not change significantly except for the months of April, May and June, where COVID 19 restriction was stricter, but after the downgrading of quarantine regulations, and allowing movements of essential workers, production basically returned back to normal (Fig. 2). This was also observed in the data sheet of Philippine Statistics Authority [1] on the volume of sardines catch in the Philippines. However, income related to sardine fishery activities from fish catch to traders and small-scale processors, on the onset of ECQ or the height of COVID 19 movement restrictions, fell two to three times as compared to the normal periods or in comparison with previous years' catch volume.

However, considering that even though fishers and operators positively acknowledged that there was no change in sardines' production, a significant drop in their income was felt. Examining the situation revealed that the price drop was associated to COVID 19 travel and movement restrictions that had affected related sardine's fishery activities. The implementation of travel restrictions and difficulty in securing travel passes has hindered trucking and labor services. Aside from that, labor services in fishing ports have been denied entry to the port complex. With this, ice plant operators had difficulty in providing

enough ice materials in sardines packaging. It should be noted that sardines are perishable product. As such without sufficient ice to preserve its freshness will result to spoilage and subsequent drastic drop in price.

Moreover, with the restriction guidelines, fishers specially the small-scale fishers had no choice but to reduce fishing activity and, in some instances, stopped fishing operation [2], making both ends meet more difficult to poor fishers. Since most of the sardines, landed in Bulan, are distributed to other parts of Luzon especially to Metro Manila area or shipped to canneries, deliveries of *sardines* had been limited and, in some cases, stopped delivery. The price drastically declined to as low as PhP 100.00 per tub of 40-60 kilos. This situation was aggravated by the scarcity of ice supply due to typhoons that struck Bicol area in the last quarter of the 2020.

On the positive side, the respondent, noted a big rollback on fuel price (PhP 20/liter) during the COVID period. This could be attributed to the travel restriction that slowed down economic activities including fishing. As such, the low fuel costs contributed in lowering the cost of fishing operation.

The estimated value of the average catch of sardines was shown in Fig. 3. The estimated

monthly average values of catch are almost similar to that of regular fishing periods. This is by estimating the values from the average running price of sardines in 2020 in Bulan, Sorsogon at PhP 20.00-25.00. Recent paper, made use of PhP 20.00 price to determine approximate value of sardines' production in Bulan, Sorsogon. Highest value was obtained at the beginning of COVID 19 pandemic. The month of March recorded more than PhP 6M revenue and the lowest in October which registered around PhP 2M (Fig. 3). It is also worth noting that during the months of September, October and early part of November around 7 weather disturbances namely *Leona* tropical storm (TS), *Ofel* a tropical depression (TD), *Pepito* Typhoon (Ty), *Quinta* (Ty), *Rolly* a super typhoon, *Tonyo* (TS) and *Ulysses* (Ty) (Annual tropical cyclone tracks) [12] that directly passed and/or had affected the Samar-Bicol area which could possibly contributed to the low catch volume in the area due to sailing /fishing restrictions by Philippine Maritime Authorities.

Then by later part November and December, sardines catch rose up since these are the months that represents second peak season for the year [13]. Furthermore, clear and fair-weather conditions of November-December favored fishing activities in the area.

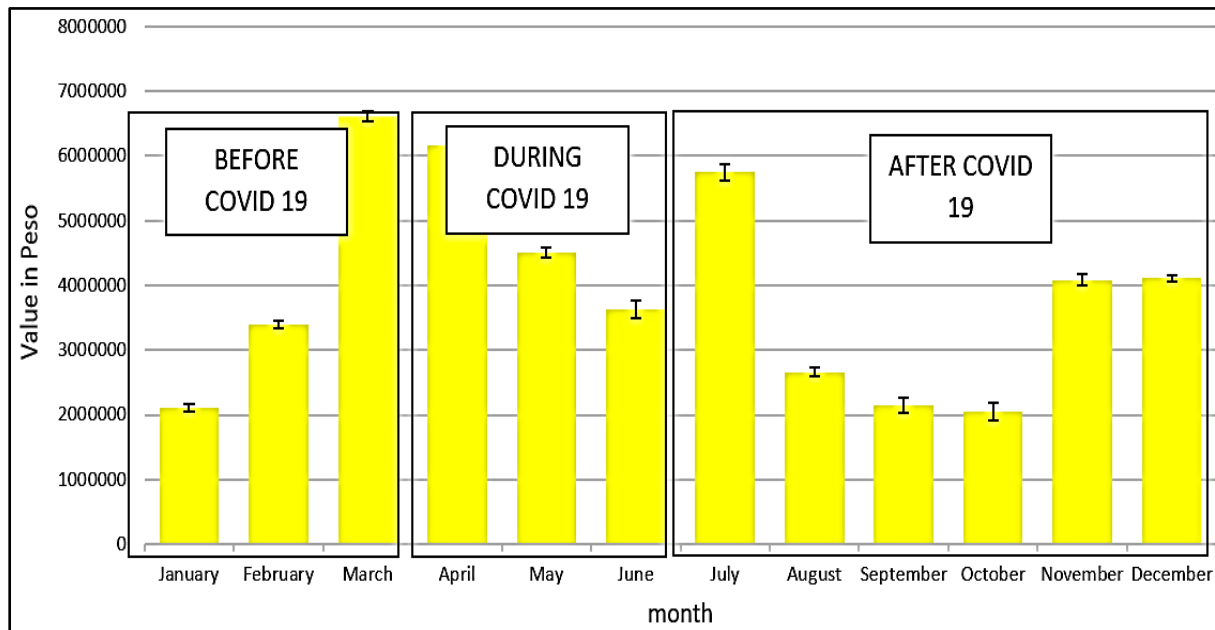


Fig. 3. Average value of sardines by largarete in Bulan Sorsogon before, during and after COVID 19 strict implementation of travel restrictions

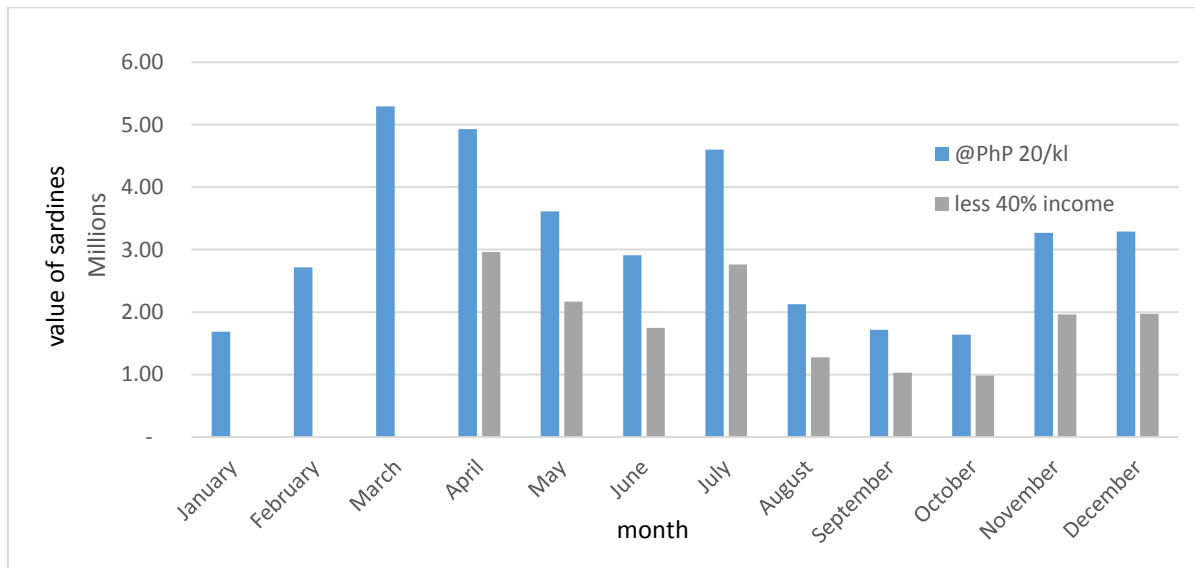


Fig. 4. Value of sardines' production and income before COVID 19 and during COVID 19 pandemic

The low price of *sardines* in Bulan, might be attributed then to the high supply but low demand. According to the respondents, the influx of sardines in the port complex but with limited buyers and shipping to Metro Manila and other parts of Luzon for canneries influenced the low price of *sardines*. Additionally, the scarcity of ice in the municipality forced some fishers to dump their catch since their catches could neither anymore be bought nor sold to local markets. Given these scenarios, fishers and operators incur an income loss estimated to about PhP 11M representing 40% of the annual production value in Bulan estimated at PhP 38M at an average price of PhP20.00 (Fig. 4).

4. CONCLUSION

Covid-19 did not affect sardine production directly, instead it affected the economics and livelihoods in sardine fishery sector. The restriction on transportation and quarantines posed great difficulties by the closure of markets, falling wholesale fish prices, sanitary requirements, and physical distancing measures. These difficulties reduced fishing activities which is directly associated to household food security of fishers. Furthermore, mobility restrictions made difficult for fishers to market and sell their products. The limited fishing activities had reduced income of fishers and operators to not less than PhP 11M during and after the pandemics.

With the lessons learned from this pandemic, the government should craft measures to building resilience to future crisis through decentralizing important food production facilities by creating regional or localized food processing terminals.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

ACKNOWLEDGEMENT

We are grateful to the support of Oceana and University of the Philippines in the Visayas. Appreciation is also extended to the local sardines' fishers and to our Research and Field Assistants.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Fisheries Situation Report; 2020. Available:<https://psa.gov.ph/fisheries-situationer>.accessed March 4, 2021
2. Bennett NJ, Finkbeiner EM, Ban NC, Belhabib D, Jupiter SD, Kittinger JN, Mangubhai S, Scholtens J, Gill D, Christie P. The COVID-19 pandemic, small-scale fisheries and coastal fishing communities. *Coastal Management*. 2020;48(4):336-347.
3. Campbell SJ, Jakub R, Valdivia A, Setiawan H, Setiawan A, Cox C, Kiyu A, Djafar LF, de la Rosa E, Suherfian W, Yuliani A. Immediate impact of COVID-19 across tropical small-scale fishing communities. *Ocean & Coastal Management*. 2021;200:105485.
4. Sunny AR, Sazzad SA, Prohdan SH, Ashrafuzzaman M, Datta GC, Sarker AK, Rahman M, Mithun MH. Assessing impacts of COVID-19 on aquatic food system and small-scale fisheries in Bangladesh. *Marine Policy*. 2021;126:104422.
5. Sambah AB, Miura F, Kadarisman HP, Sartimbul A. December. Remote sensing application for *Sardinella lemuru* assessment: a case study of the south waters of Malang Regency, East Java, Indonesia. In *Remote Sensing of the Marine Environment II* (Vol. 8525, p. 85250M). International Society for Optics and Photonics; 2012.
6. Olaño VL, Vergara MB, Gonzales F. Assessment of the fisheries of Sorsogon Bay (Region 5). BFAR NFRDI Technical Paper Series. 2009;12(4):1-33.
7. Villanoy C, Cabrera O, Yñiguez A, Camoying M, De Guzman AA, David L, Flament PP. Monsoon-driven coastal upwelling off Zamboanga Peninsula, Philippines. *Oceanography*. 2011;24(1):156-165.
8. Dalzell P, Corpuz P, Arce F, Ganaden R. Philippine small pelagic fisheries and their management. *Aquaculture Research*. 1990;21(1):77-94.
9. Willette D, Bognot E, Mutia M, Santos M. Biology and ecology of sardines in the Philippines: A review. BFAR Technical Paper Series. 2011;13:1-20.
10. Udareb-Walker MJB, CL Villanoy. Structure of potential upwelling areas in the Philippines. *Deep-Sea Research*. 2001;48:1499-1518.
11. Aripin IE, Showers PAT. Population parameters of small pelagic fishes caught off Tawi-Tawi, Philippines. *Naga, The ICLARM Quarterly*, 2000;23(4):21-26.
12. Annual Tropical Cyclone Tracks. Available:<http://bagong.pagasa.dost.gov.ph/information/about-tropical-cyclone>
13. Rola AC, Narvaez TA, Naguit MRA, Elazegui DD, Brillo BBC, Paunlagui MM, Cervantes CP. Impact of the closed fishing season policy for sardines in Zamboanga Peninsula, Philippines. *Marine Policy*. 2018;87:40-50.

© 2022 Mendoza and Nieves; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/84602>