

Hook and Line Fishery in Selected Areas of Datu Odin Sinsuat, Maguindanao

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Abstract - Hook and line is one of the small-scale fishing gears employed by fishermen in the coastal waters in the Autonomous Region in Muslim Mindanao (ARMM). This study provides information on the socio-demographic and economic profiles of fishermen engaged in hook and line fishery in coastal waters of Datu Odin Sinsuat, Maguindanao. The catch composition, volume, relative abundance and catch per unit effort (CPUE) of hook and line were determined. Likewise, the marketing strategies and problems encountered by hook and line fishermen were also identified. A total of 61 respondents from the 6 coastal areas were interviewed. Results of the study revealed that hook and line fishers in Datu Odin Sinsuat, Maguindanao were mostly married (83.61%) male husbands (85.25%) with ages from 35-44 (29.51%) who never completed their elementary education (54.10%). Most fishermen practiced Islam faith (78.69%) spoke Maguindanaon (70%) with a household size of 5-8 (55.74%) and lived in *Bahay Kubo* (80.33%). The fishermen devoted full time in fishing as their major source of income and earned about Php 5,001-10,000 (39.34%). Majority of these fishermen owned (62.29%) motorized (65.57%) boats. There were 32 species belonging to 13 families caught by hook and line fishermen. *Gymnosarda unicolor* under family Scombridae was the most dominant with 20.13% in terms of weight, while *Balistapus undulatus* and *Parupeneus multifasciatus* under family Balistidae and Mullidae were the prevailing species by numbers (10.81%). Scombridae was the most dominant family by weight (29.88%) while family Serranidae outnumbered them with 21.62%. The average catch per unit effort (CPUE) was 566 g.h⁻¹ for the whole duration of fishing activity. The fishermen sold their catch directly to the buyers. Problems encountered by fishermen were damaged boats and gear, increasing number of fishermen and vulnerability to natural calamities. Appropriate solutions were suggested by fishermen to address the pressing problems.

Key words: Hook and line fishery, catch volume, catch per unit effort

INTRODUCTION

Datu Odin Sinsuat (formerly Dinaig), officially the Municipality of Datu Odin Sinsuat, is a 2nd class municipality in the province of Maguindanao, Cotabato, Philippines. According to the 2020 census, it has a population of 116,768 people [1]. Out of 34 barangays, six (6) are coastal areas fringing Illana bay, which is part of Moro Gulf and one among the major fishing grounds in the Philippines [2].

The hook and line is listed among major gears used in the BARMM region [3]. This gear is described as a device consisting of baited and

non-baited hook/s attached to a line. This can be further classified as simple handline, multiple handlines and longline [4]. Handline fishing is one of the simplest fishing methods used by many artisanal fishermen and requires simple gears and materials which are economical for the fishermen involved. Using simple handline contributes to the fishermen's income and can be used in catching pelagic and demersal species.

The Ministry of Agriculture, Fisheries and Agrarian Reform (MAFAR) 2019 Fisherfolk registration (FishR) system recorded approximately 1,500 fisherfolks among the coastal areas of Datu Odin Sinsuat,

Maguindanao, of which an estimated of 10% were using handline fishing. The Ministry of Agriculture, Fisheries and Agrarian Reform (MAFAR), is the regional executive department of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) responsible for affairs relating to agriculture, fishing, and agrarian reform in the region. Unfortunately, a study on the socio-demographic and socio-economic condition on the hook and line fishing operations are not documented yet, particularly in Datu Odin Sinsuat, Maguindanao. The study is a step towards getting baseline information on the socio-demographics and socio-economics of fishing operation using simple hook and line in the area.

This study aimed to determine the status of the hook and line fishery of Datu Odin Sinsuat, Maguindanao. Specifically, this study sought to determine the socio-demographic and socio-economic profile of fishermen, determine the species composition, relative abundance, and catch per unit effort (CPUE) of finfishes caught by hook and line; and to determine their marketing strategies and the problems encountered by fishermen using hook and line and the suggested solutions to solve the problems.

MATERIALS AND METHODS

Research Design

The study employed the descriptive method of research to describe the existing condition of the hook and line fishery in the selected areas of Datu Odin Sinsuat, Maguindanao both from household survey and actual fishing operation.

Location of the Study

The study was conducted in the coastal barangays and municipal waters of Datu Odin Sinsuat, Maguindanao in the western side of Illana Bay (Figure 1).

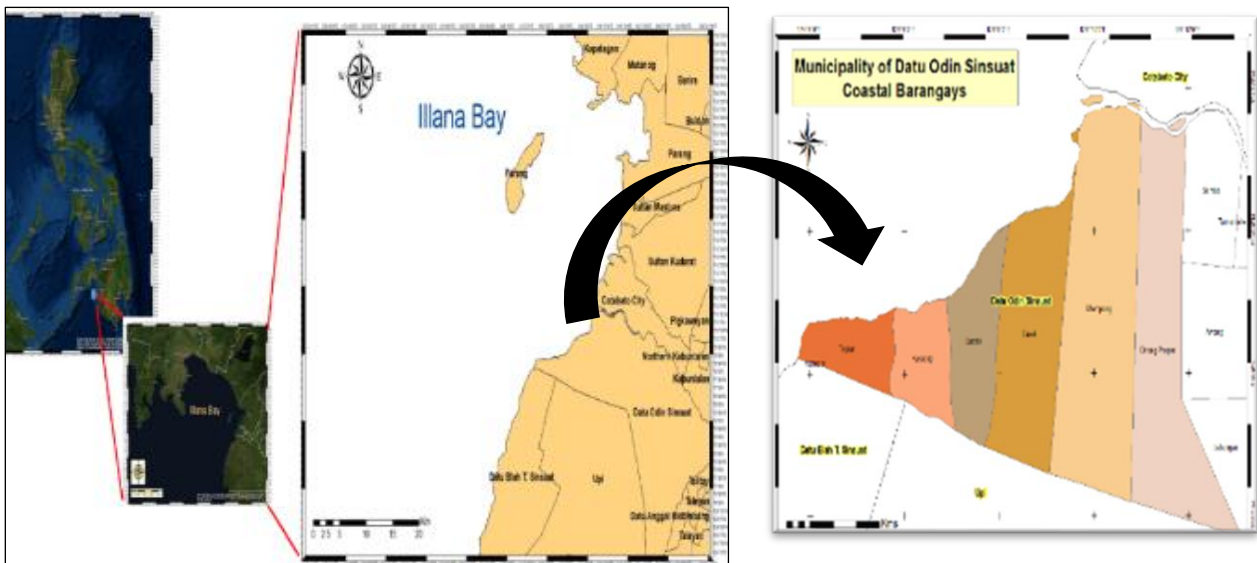


Figure 1. Map extracted from ArcGIS with 10.2 version showing coastal barangays of Datu Odin Sinsuat, Maguindanao, Philippines.

Data Gathering Procedure

Household Survey

Survey on the socio-demographic and economic profiles of respondents in the 6 coastal barangays of Datu Odin Sinsuat, Maguindanao, namely: Proper Dinaig, Mompong, Linek, Badak, Kusiong and Tapian was conducted using an interview guide. There were 61 respondents in the study across the 6 coastal barangays. The issues and problems including their recommendations pertaining to the use of simple hook and line fishing were obtained. The marketing strategies of fish simple handliners were also noted.

Identification of Species Composition

All harvested catch from hook and line was collected and recorded from the hired fishermen. The identification of species composition was undertaken using field guide literatures [5-7]. Verification on the taxonomy of species was done through the aid of online Fishbase [8]. Local and vernacular names of species were also taken.

Determination of Volume of Catch and Relative Abundance

The volume of catch of hook and line was estimated based on the obtained weight of species caught by the gear. Likewise, the relative abundance of species was also calculated. The following formulae were used:

Mean Volume (kg) = Total Volume of Catch (kg)/Number of Species

Monthly Mean Volume (kg) = (Total Volume of Catch (kg) of Species)/ (Number of Months)

Relative Abundance (%) = (Number of Single Species Caught)/(Total Number of Species Caught) X 100

Determination of Catch Per Unit of Effort (CPUE)

The Catch Per Unit Effort (CPUE) of hook and line was determined by getting the total catch (g) over the total time spent for fishing (h). The following formula was adopted [9]:

Catch Per Unit Effort (CPUE) = Total Catch (g)/Total time spent for fishing (h)

Data Treatment and Analysis

All data collected were inputted and analyzed using appropriate software. The frequency, counts and means were taken based on the descriptive statistics generated by the software.

RESULTS

Socio-Demographic Profile

The socio-demographic profile of fishermen engaged in hook and line fishery in Datu Odin Sinsuat, Maguindanao is presented in Table 1. The selected respondents of the study were all males because of the nature of work since women are generally involved in household chores. Among 61 respondents, 85.25 % were composed of fathers/husbands while the remaining 14.75 % were their sons. The age distribution of the respondents ranged from under 15 to 65 years old and above. Majority belonged to age 35-44 (29.5%), followed by 45-54, 25-34, 15-24,

55-64 and both under 15 and above 65 with 24.59%, 18.03%, 14.75%, 9.84% and 1.64%, respectively. Majority of the respondents interviewed were Maguindanaon (70%), followed by Teduray and Iranun with 23% and 7%, respectively. The Teduray are Filipino ethnic group, and also considered indigenous people. More than half of the respondents (54.10%) have attained elementary level education, followed by 18.03% for both Elementary graduates and High School level. Only 3.28% have finished high school education. The same percentage (3.28%) for those who have received no basic education. Only few (1.64%) have attained College Level and College Graduate. Most of the respondents were married (83.61%), while unmarried fishermen represented only 14.75% and 1.64% as reported widowed.

The average household size of the respondents was composed of 5-8 family members (55.74%), followed by under 5 members within their family, 9-12 family members and a family composition of 13-16 members with 24.59%, 16.39% and 1 %, respectively. In terms of religion, the Islam dominated with 78.69%, followed by Christianity and Indigenous People with a total of 13.11% and 8.20%, respectively. Majority (80.33%) of the respondents' types of dwellings was *Bahay Kubo* (made out of woods, nipa and/or bamboos) houses while 14.75% have houses made of semi-concrete. Few (3.28%) have concrete houses while a small percentage (1.64%) have makeshift shacks (*barong-barong*).

Table 1. Socio-demographic profile of hook and line fishermen in Datu Odin Sinsuat, Maguindanao, Philippines.

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Gender			Religion		
Male			Islam	48	78.69%
Father	52	85.25%	Christian	8	13.11%
Son	9	14.75%	Indigenous People	5	8.20%
Age			Educational level		
65 and above	1	1.64%	Elementary Level	33	54.10%
55-64	6	9.84%	Elementary Graduate	11	18.03%
45-54	15	24.59%	High School Level	11	18.03%
35-44	18	29.50%	High School Graduate	2	3.28%
25-34	11	18.03%	College Level	1	1.64%
15-24	9	14.75%	College Graduate	1	1.64%
Under 15	1	1.64%	None	2	3.28%
Marital Status			Ethnicity		
Married	51	83.61%	Maguindanaon	43	70.00%
Single	9	14.75%	Teduray	14	23.00%
Widowed	1	1.64%	Iranun	4	7.00%
Household size			Type of Dwellings		
13-16	1	1.00%	Bahay Kubo	49	80.33%
9-12	10	16.39%	Concrete	2	3.28%
5-8	34	55.74%	Semi-concrete	9	14.75%
Below 5	5	24.59%	Barong-barong	1	1.64%

Socio-Economic Profile

With regard to the socio-economic profile of the hook and line fishermen in Datu Odin Sinsuat, Maguinadanao (Table 2), majority (80.33%) of the respondents are engaged in full time fishing as their main source of income. The remaining (19.67%) have part time jobs to augment their income from fishing. Others are also engaged in farming, carpentry, driving, value adding, selling and etc. The income of these fishermen is quite low. About 42.62% generate a monthly income ranging from Php 1,000 to 5,000 pesos in fishing operations,

followed by Php 5,001 to 10,000, Php 10,001 to 15,000 with 39.34% and 14.75%, respectively. Only few (1.64%) can earn Php 15,001 to 20,000 and Php 25,001 to 30,000 in a month. Majority (62.29%), of the respondents have their own boats while 36.07% shared a boat. To those who cannot afford to buy their own boats, they opted to rent. Around (1.64%) among them rented boats. The boat used by the fishermen was either a motorized or non-motorized. Majority (65.57%) utilized motorized boats while the other 34.43% used non-motorized boats.

Table 2. Socio-economic profile of hook and line fishermen in Datu Odin Sinsuat, Maguinadanao, Philippines.

Variable	Frequency	Percentage
Sources of Income		
Full time	49	80.33%
Part time	12	19.67%
Estimated Monthly Income		
25,001-30,000	1	1.64%
15,001-20,000	1	1.64%
10,001-15,000	9	14.75%
5,001-10,000	24	39.34%
1,000-5,000	26	42.62%
Boat Ownership		
Owned	38	62.29%
Rented	1	1.64%
Shared	22	36.07%
Type of Boat		
Motorized	40	65.57%
Non-motorized	21	34.43%

Species Composition

The simple handline type of fishing gear caught both pelagic and demersal species comprising a total of thirty-two (32) fish species belonging to thirteen (13) families (Table 3) from December 3-9, 2020. However, among the fish caught, only eight fish families were important and valued in the market namely, Belonidae, Carangidae, Lethrinidae, Lutjanidae, Mullidae, Nemipteridae, Scombridae and Serranidae

while the others were lumped and sold together whenever small quantities were caught.

Volume of Catch and Relative Abundance

The total catch during the actual on-board fishing operation using simple handline within seven days (1 week) was 23.789 kg, for an estimated total mean volume of 3.398 kg day⁻¹.

Table 3. List of fish species caught in the study area.

Family	Species	Common Name	Local Name
Balistidae	<i>Balistapus undulatus</i>	Orange striped triggerfish	Pakol
	<i>Malichthys niger</i>	Black triggerfish	Pakol
Belonidae	<i>Tylosurus acus melanotus</i>	Agujan needlefish	Balo/Kambabalo
Carangidae	<i>Caranx melampagus</i>	Blue-fin trevally	Talakitok
	<i>Caranx hippos</i>	Yellow cavalli	Talakitok
	<i>Carangoides plagiotaenia</i>	Oblique dash banded trevally	Talikitok
	<i>Seriola rivoliana</i>	Almaco jack	Salmon
Holocentridae	<i>Myripristis kuntee</i>	Squirrel fish	Baga
	<i>Sargocentron rubrum</i>	Squirrel fish	Baga
Labridae	<i>Oxycheilinus diagrammus</i>	Violet-lined maori wrasse	Mulmol
Lithrinidae	<i>Lethrinus microdon</i>	Smalltooth emperor	Dunso
Lutjanidae	<i>Aprion virescens</i>	Green jobfish	Buntol
	<i>Aphareus rutilans</i>	Rusty jobfish	Asang/Tigi
	<i>Lutjanus biguttatus</i>	Two-spotted snapper	Sang/Tigi
	<i>Lutjanus rufolineatus</i>	Yellow-lined snapper	Kamang
	<i>Lutjanus vitta</i>	Brown-striped seaperch	Kamang
Monacanthidae	<i>Aluterus scriptus</i>	Scrawled filefish	Saguksok
Mullidae	<i>Parupeneus bifasciatus</i>	Goatfish	Samulyete
	<i>Parupeneus multifasciatus</i>	Goatfish	Samulyete
Nemipteridae	<i>Nemipterus zysron</i>	Slender threadfin bream	Bisugo
Scombridae	<i>Gymnosarda unicolor</i>	Dogtooth tuna	Tambakol
	<i>Grammatorcynus bilineatus</i>	Double-lined mackerel	Anday-anday
	<i>Auxis thazard</i>	Frigate tuna	Pirit/Tulingan
	<i>Katsuwonus pelamis</i>	Skipjack tuna	Gulyasan
Serranidae	<i>Cephalopholis sexmaculata</i>	Six blotch hind	Kurapu/Lapu-lapu
	<i>Cephalopholis miniata</i>	Coral hind grouper	Kurapu/Lapu-lapu
	<i>Cephalopholis cyanostigma</i>	Blue-spotted hind	Kurapu/Lapu-lapu
	<i>Cephalopholis urodelus</i>	Flag-tailed grouper	Kurapu/Lapu-lapu
	<i>Plectropomus areolatus</i>	Square-tail coral grouper	Kurapu/Lapu-lapu
	<i>Plectropomus maculatus</i>	Blue-spotted grouper	Kurapu/Lapu-lapu
	<i>Variola albimarginata</i>	White-edged lyre tail	Kurapu/Lapu-lapu
Synodontidae	<i>Saurida gracilis</i>	Brush-tooth lizardfish	Tiki

Among thirty-two (32) species caught (Figure 2), *Gymnosarda unicolor* under family Scombridae was the most dominant with 20.13% (4,788g), followed by *Caranx melampegus* (Carangidae), *Malichthys niger* (Balistidae), *Balistapus undulatus*

(Balistidae) and *Katsuwonus pelamis* (Scombridae) with 13.59% (3,233g), 8.50% (2,022g), 7.80% (1,861g) and 5.23% (1,265g), respectively. While the remaining 44.62% (10,620g) were composed of twenty-seven (27) different species.

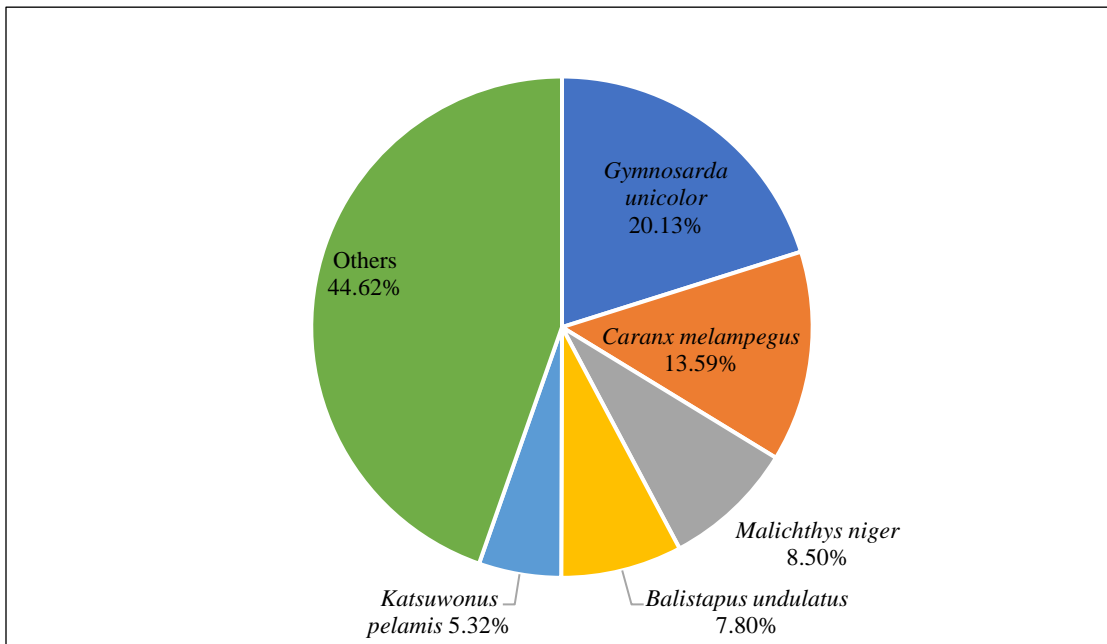


Figure 2. Top five (5) relative abundance by species in terms of weight.

In terms of relative abundance by species and numbers (Figure 3), both *Balistapus undulatus* and *Parupeneus multifasciatus* under family Balistidae and Mullidae had an equal 10.81% or consisted of twelve (12) individuals. They were followed by *Malichthys niger* and *Lutjanus rufolineatus* (Balistidae and Lutjanidae) with 8.11% (9 each), *Caranx hippos* (Carangidae) and *Cephalopholis sexmaculata* (Serranidae) with 7.21% (8 each), *Caranx melampegus*

(Carangidae) with 4.50% (5), *Carangoides plagiotaenia* (Carangidae), *Parapeneus bifasciatus* (Mullidae), *Cephalopholis urodelus* and *Variola albimarginata* (Serranidae) with 3.60% (4 each) and lastly, *Seriola rivoliana* (Carangidae), *Auxis thazard* (Scombridae) and *Cephalopholis cyanostigma* (Serranidae) with 2.70% (3 each). On the other hand, 20.72% (23 individuals) were comprised of 18 different species.

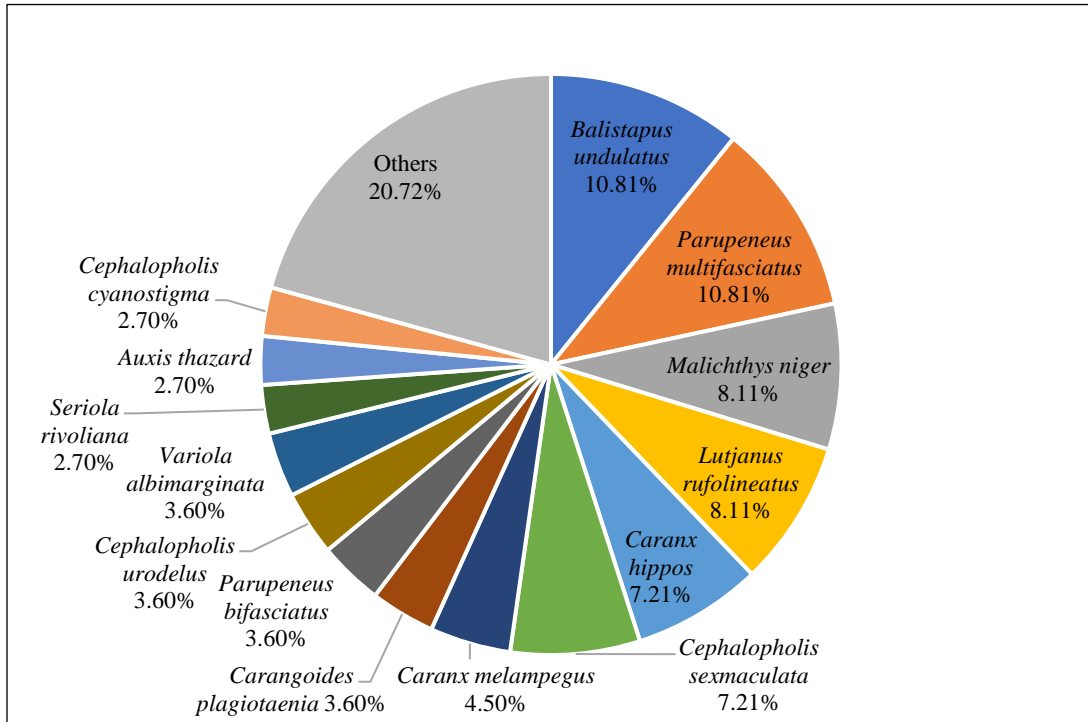


Figure 3. Top five (5) relative abundance by species in terms of numbers.

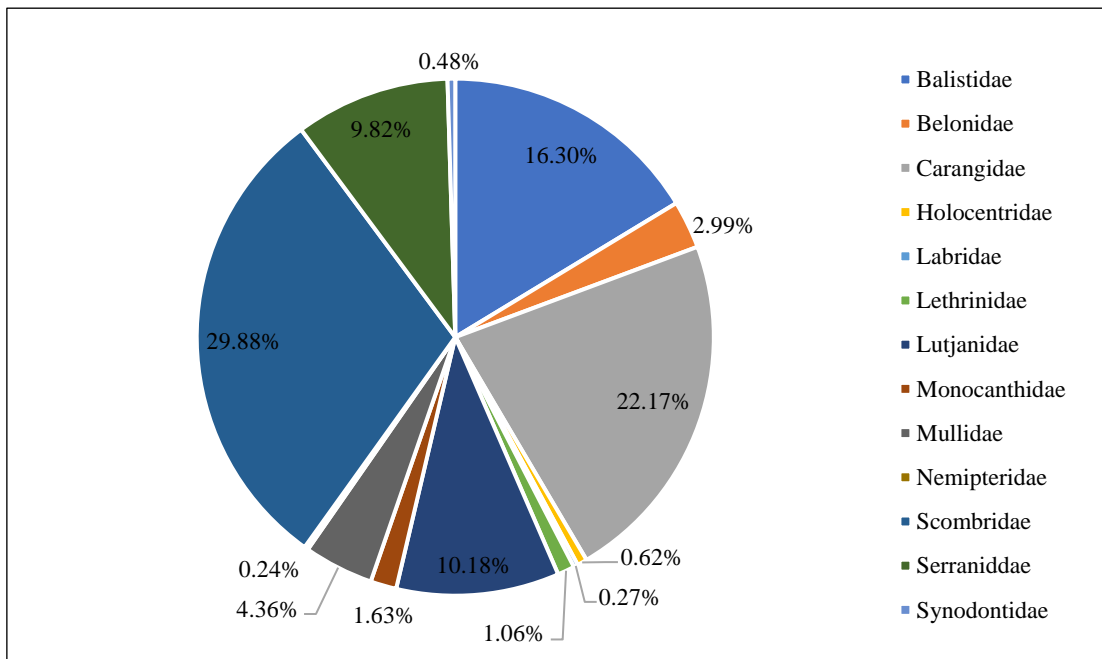


Figure 4. Relative abundance by family in terms of weight.

On the other hand, the relative abundance (weight) of catch by family (Figure 4), Scombridae was the most dominant comprising 29.88% (7,120g) of the total sample caught in the entire fishing activity, followed by Carangidae, Balistidae, Lutjanidae, and Serranidae with 22.17% (5,283g), 16.30% (3,883g), 10.18% (2,425g), and 9.82% (2,340g), respectively. While eight other families caught at small quantities accounted to 11.63% (2,738g).

With regard to relative abundance (numbers) by family (Figure 5), Serranidae was the dominant with 21.62% (24 individuals) followed by Balistidae, Carangidae, Mullidae and Lutjanidae with 18.92% (21 individuals), 18.02% (20 individuals), 14.41% (16 individuals) and 12.61% (14 individuals). The eight other families caught in small numbers comprised 23.41% (16 individuals).

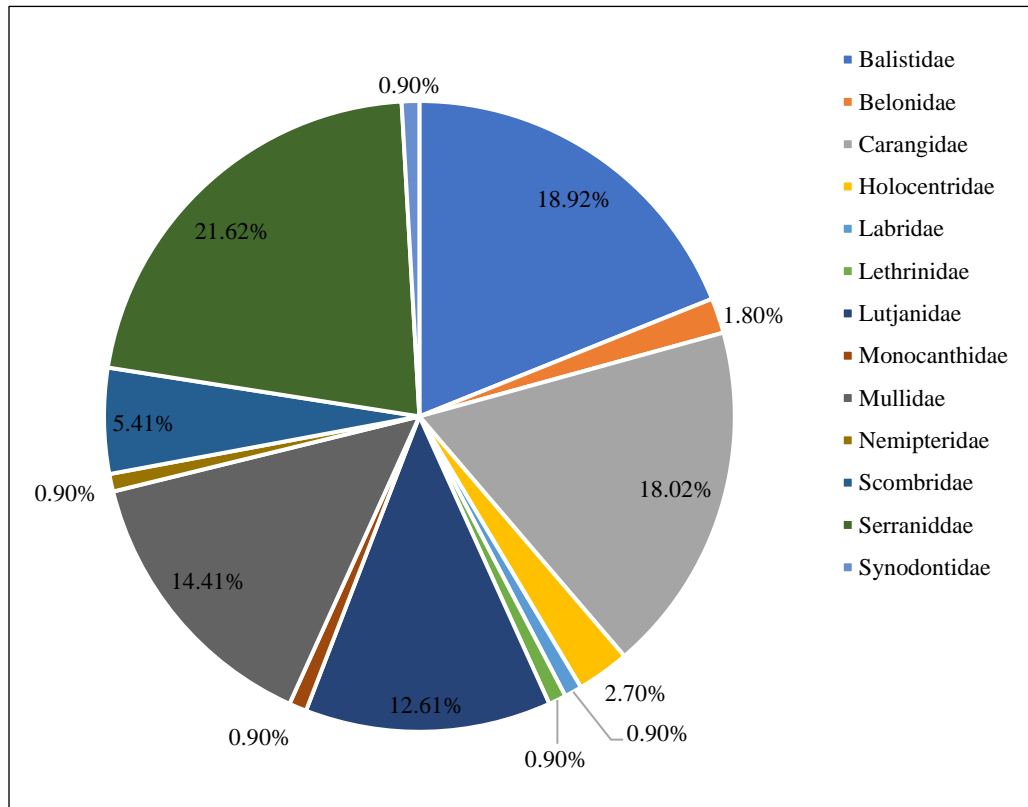


Figure 5. Relative abundance by family (in terms of numbers).

Catch per Unit Effort (CPUE)

Overall, there were seven simple handline fishing operations conducted with two fishing trips a day (morning and afternoon) with an estimated 6-hour time of fishing. Based on the data obtained (Figure 6), the average Catch per unit Effort (CPUE) was 566 g.h⁻¹ for whole duration of fishing activity. Day 7 had the highest CPUE with 1077 g.h⁻¹ followed by Day 6, Day 3, Day 2, Day 1, Day 4 and Day 5 with 758, 649, 463, 417, 311 and 291 g.h⁻¹, respectively.

Marketing Strategy

Figure 7 showed that majority of the respondents (77.05%) sell their catch either direct to the buyers or sold their fish to consumers. While 8.2% involved in value adding such as making dried fish and fish fermentation. The 14.74% with no marketing strategy otherwise would use it for their own consumption. Fishermen consumed their catch if the number of catch is bountiful and/or if it is the other way around (small catch) but their priority is to sell their catch to generate income within a day.

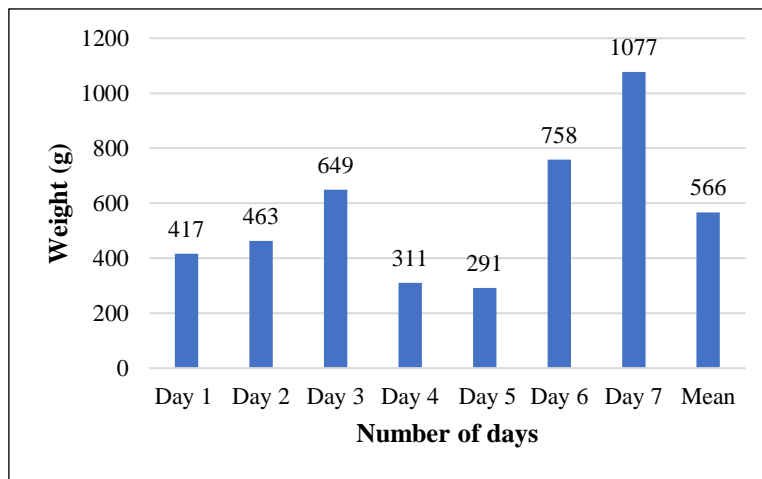


Figure 6. Estimated CPUE of simple handline in the study area.

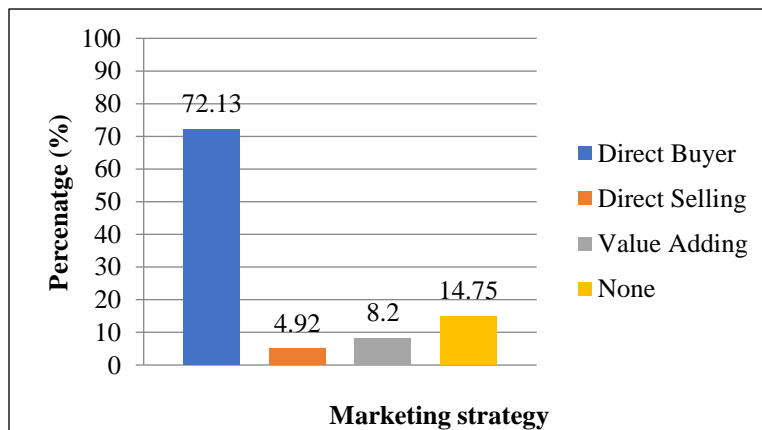


Figure 7. Marketing strategy of the fishermen in the study area.

Issues/Problems Encountered and Suggested Solutions

During the interview, fishermen were simultaneously asked what are issues and problems they have encountered particularly in the use of simple handline gear and what are the proposed solutions to address such issues and concerns. Table 4 shows the issues/concerns/problems with the suggested solutions and recommendations.

DISCUSSION

The dominance of male fishermen in the hook and line fisheries in Datu Odin Sinsuat, Maguindanao suggests that fishing is a man’s work. In a study in Sta. Ana Cagayan, it was found out that fishermen involved in fly fishing were all males [10]. Likewise, the fishermen engaged in trawl fishing in Samar Sea were mostly (99%) males [11]. Most of the hook and line fishermen were married and at their prime age for fishing activities. This in comparison

with another study where married fishermen aged 31 to 50 years old engaged in crab fishery dominated the group [12]. Notably, the hook and line fishermen have low educational attainment, mostly elementary level. This indicates that poverty may have hindered them to pursue higher education. It was also noted that fishermen in San Miguel Island, Albay have low educational profile, mostly attaining only elementary education [13]. This is also similar with trawl fishermen in Samar Sea having inadequate education, majority achieving elementary education [11]. Most hook and line fishermen belonged to Maguindanoan ethnic group and practiced Islam faith considering that Maguindanao is one of the bulwarks of Islam religion in Mindanao island. The household size in Datu Sinsuat conforms to the municipal average household size of 6.0 [14]. The Autonomous Region in Muslim Mindanao (ARMM) which Maguindanao belongs had the highest average household size of 6.0 persons in the country [14].

Table 4. Issues/problems/concerns with the suggested solutions and recommendation.

Issues/Problems/Concerns	Suggested Solutions/Recommendations
1. Damaged boat and under quality fishing gears used	- regularly/often replaced and changed the gear such as nylon and hook - provide and supply a fishing boat (motorized) the fishermen who are not able to buy yet fishing is their primary source of daily income
2. Many fishers in the coastal waters	- provide alternative livelihood
3. Vulnerability to natural calamities	- Develop resiliency through capacity building

The Autonomous Region in Muslim Mindanao (ARMM) which Maguindanao belongs had the highest average household size of 6.0 persons in the country [14]. The fishermen have a simple house made up of nipa and bamboos, locally known as *Bahay Kubo* (nipa hut). The type of house maybe attributed to their meager income from fishing that they could not afford to build a more decent concrete house. The ARMM region has one of the highest poverty incidences in the country. In 2018, 61.3 percent of families in the region had per capita income insufficient to meet basic food and non-food needs [15]. Most of the hook and line fishermen devoted their to fishing while others have part time jobs. This was also the findings from flying fish fishermen in Sta. Ana, Cagayan where majority are full time while others do part time jobs as construction workers, drivers or farming [10]. The average income of hook and line fishermen is below the region's poverty threshold of PhP 13,578.00 in 2018 [15]. Surprisingly, most of the fishermen owned a motorized boat for fishing. Since hook and line is a passive gear and easy to handle, a small motorized boat is just enough. However, Nieves et al (2009) disclosed that fishermen in San Miguel Island, Albay owned boats that are non-motorized [13].

Result of the hook and line fishing operation in the municipal waters of Datu Odin Sinsuat, Maguindanao revealed the catch of both the demersal and pelagic species. There were 32 species belonging to 13 families identified. This result is higher compared to the study conducted in the Puerto Princesa Bay in Palawan with 16 species under 10 families [9] and slightly higher in terms of species but lower in terms of families in the study conducted in the Persian Gulf [16]. In Bolinao waters, it was revealed that *Lethrinus rodopterus* under family Lethrinidae dominated the catch of

hook-and-line fishing [17]. On the other hand, *Mene maculata* was identified as the most dominant catch while family Carangidae contributed the highest percentage catch in Sarangani Bay [18].

The total catch during the actual on-board fishing operation totaled 23.789 kg. The estimated total mean volume of 3.398kg day⁻¹ (3,398g day⁻¹) and the estimated monthly mean volume of 95.156 kg month⁻¹. The estimated catch was similar to an estimate in another study [19]. The harvested catch of hook and line was higher than that of Palawan where an average of 814 g hr⁻¹ was obtained [9]. A CPUE of handline from 35 to 115 kg/trip-day was observed in General Santos [20]. Likewise, in Sarangani Bay, a lower CPUE of bottom set long line of 6.1 kg/day from 2008-2012 in Sarangani Bay [18]. The CPUE is also dependent on the skill, ability and knowledge of fishermen, fishing power (suitable line, hook and sinker) type of bait, fishing hours and other fishing techniques [19, 21].

Southern Philippine seas have, however, biodiversity and fishery species (primarily tunas) that do not occur in large numbers in other parts of the country, upon which an estimated six million people depend directly for livelihood and income. The marine environment of southern Philippines is more complex than those in other parts of the country because of the bottom topography, oceanography and vastness of the Sulawesi Sea [22]. These physical and environmental features are the primary reasons for the enormous marine resource production and development potentials of southern Philippines.

The marketing strategy which is either selling direct to buyers or to consumers (77.05%) is in line with another study [23].

The marketing strategies of small-scale fishing in the Philippines are almost similar throughout the country [24]. The fishers have their catch sold to brokers or within their barangay. In the case of issues and problems of hook and line fishery, these are similar to the problems of handline fishery in General Santos City [20]. An assessment on the small-scale fisheries in 8 regions in the Philippines in 2012 was conducted and identified key management issues affecting small-scale fishermen [25]. The challenges of small-scale fisheries in the Philippines are enormous and how can these existing issues can be addressed properly by both the government and the local fishermen still remain to be done [26].

REFERENCES

- [1] PSA. 2020. Census of Population (2020). "BARMM". Total Population by Province, City, Municipality and Barangay. PSA. Retrieved 8 July 2021.
- [2] DA-BFAR. 2019. Philippine Fisheries Profile 2019. Bureau of Fisheries and Aquatic Resources PCA Compound, Elliptical Road, Quezon City.
- [3] Santos, M.D., Barut, N.C. and AD Bayate (Editors). 2017. National Stock Assessment Program: The Philippine Capture Fisheries Atlas. Bureau of Fisheries and Aquatic Resources - National Fisheries Research and Development Institute. Quezon City, Philippines. Siar, S. V., Suuronen, P and Gregory, R., eds. 2017. Socio-economics of trawl fisheries in Southeast Asia and Papua New Guinea. FAO Fisheries and Aquaculture Proceedings No. 50. Rome, FAO.
- [4] Dugan, C.E., Bernarte, A.L. Jr. and C.A.C. Vera Jr. 2003. Guide to Fishing gears in the Philippines. Sentro para sa Ikauunlad ng Katutubong Agham at Teknolohiya, Inc. (SIKAT, Inc.). Philippines.
- [5] Carpenter, K.E., Niem, V.H. 1999a. FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 3. Batoid fishes, chimaeras and bony fishes part 1 (Elopidae to Linophrynidae). FAO, Rome.
- [6] Carpenter, K.E., Niem, V.H. 1999b. FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 4. Bony fishes part 2 (Mugilidae to Carangidae). FAO, Rome.
- [7] Gonzales, B.J. 2013. Field Guide to Coastal Fishes of Palawan. Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF). 208 p.
- [8] Froese, R. and D. Pauly. Editors. 2019. FishBase. World Wide Webelectronic publication. www.fishbase.org, version 2019.
- [9] Gonzales, J.B. 2019. Species composition, length-weight relationship (LWR) and catch per unit effort (CPUE) of handline fishing in Puerto Princesa Bay, Palawan, Philippines. *International Journal of Fisheries and Aquatic Studies* 7(4): 166-171.
- [10] Molina, L.P., Daluddung, E.S. and L.G. Amog. 2018. Socio-demographic profile and handling practices of flying fish fishers: Policy implication. *International Journal of Science and Research* 8(7): 60-65.
- [11] Ramiscal, R.V., Dickson, J.O., Salvador, N., Hilario, E.V. and R.O. Romero. 2017. Socio-economic study of trawl fisheries in Samar Sea, Philippines. pp. 69 – 118. In: Socio-economics of trawl fisheries in Southeast Asia and Papua New Guinea (Siar, S. V., P. Suuronen, and R. Gregory, Eds.). *FAO Fisheries and Aquaculture Proceedings No. 50*. 848 Rome, FAO.
- [12] De la Cruz, M.T., de la Cruz, J.O., Ruizo, E.K.C. and I.L. Tan. 2018. The Blue Swimming Crab Fishers and Fishing Practices in Leyte and Samar, Philippines. *The Philippine Journal of Fisheries* 25(2): 1-15.

- [13] Nieves, P., Pelea, N., Bradecina, R., Pereyra, M., Morooka, Y., Shinbo, T. and M. Rivero. 2009. Socio-economic conditions, the status of fisheries and agriculture and the adaptive capacities of households and communities in San Miguel Island, Albay, Philippines in the Kuroshio Sphere of Influence. *Kuroshio Science* 3(1): 15-32.
- [14] PSA. 2017. Poverty Incidence (PI). Philippine Statistics Authority.
- [15] PSA. 2018. Poverty Incidence (PI). Philippine Statistics Authority.
- [16] Paighambari, S.Y. and M. Eighani. 2017. Study on different hook and bait types in the Persian Gulf hand line fishery: optimization and development. *Aquatic Living Resources* 30(23): DOI: <https://doi.org/10.1051/alr/2017007>
- [17] Acosta, A.R. 1987. Abundance and catch composition of three fishing gears (hook-and-line trap and Spear) in a Coral Reef, Santiago Island, Cape Bolinao, Philippines. Open Access Master's Theses. University of Rhode Island. Paper 822. <https://doi.org/10.23860/thesis-acosta-alejand-1987>
- [18] Emperua, L., E. Donia, M. Biaca, R. Pechon, A. Pautong and T. Balonos. 2018. The Small Pelagic Fisheries of Sarangani Bay, Southern Mindanao, Philippines. *The Philippine Journal of Fisheries* 25 (1): 118-127.
- [19] Monteclaro H., Anraku K. and S. Ishikawa S. (Editors). 2017. Field Guidebook on Philippine Fishing Gears: Fishing Gears in Estuaries. Research Institute for Humanity and Nature, Kyoto, Japan, 159 p.
- [20] West, R.J., Palma, M.A., Barut, N., Garvilles, E. and D. Ayanan. 2011. Preliminary assessment of the handline (banca) fisheries in the Philippines (FIS/2009/033). Final Report 2011, Canberra, ACT: Australian Centre for International Agricultural Research.
- [21] Kawaguchi, K. 1977. Handline and longline fishing explorations for snapper and related species in the Caribbean and adjacent waters. *Marine Fisheries Review* 36: 8-31.
- [22] Alcalá, A.C., Ingles, J.L. and A.A. Bucol. 2008. Review of the biodiversity of southern Philippine seas. *Philippine Scientist* 45: 1-61.
- [23] Parashar, V., Bara, S.K., Damde, D., Kumar, A. and V. Vyas. 2016. Assessment of the socioeconomic status of fishermen communities: A case study from a selected reach of River Narmada, India. *International Journal of Research in Fisheries and Aquaculture* 6(2): 47-59.
- [24] O'Neill, E.D., Lindahl, T., Daw, T., Crona, B., Ferrer, A.J.G. and R. Pomeroy. 2019. An experimental approach to exploring market responses in small-scale fishing communities. *Frontiers in Marine Science* 6:1-16.
- [25] Perez, M.L., Pido, M.D., Garces, L.R. and N.D. Salayo. 2012. Towards Sustainable Development of Small-Scale Fisheries in the Philippines: Experiences and Lessons Learned from Eight Regional Sites. WorldFish, Penang, Malaysia. Lessons Learned Brief 2012-10.
- [26] Courtney, C.A., Jhaveri, N. J., Pomeroy, R., and S.H. Brooks. 2016. Marine tenure and small-scale fisheries: Learning from the Philippines experience, Washington, DC: USAID Tenure and Global Climate Change Program.