



## An assessment of small-scale fisheries in Tandubas, Tawi-Tawi, southern Philippines

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### Article Info

Received:

03/03/2022

Accepted:

30/05/2022

### Keywords:

- Small-scale fisheries
- Fishing gears
- Fishing
- Inventory
- Tawi-Tawi
- Philippines

### Abstract

Fishing is the major livelihood of coastal villagers in Tawi-Tawi, southern Philippines due to the fact that Tawi-Tawi is situated in the heart of the coral triangle, the world center of coral reef biodiversity. In this work, small-scale fisheries in Tandubas, Tawi-Tawi, southern Philippines, were assessed. An inventory of fishing gears among the fishers (n=100) was carried out through one-on-one interviews using a guide questionnaire. The inventory included the commonly used fishing gears, their specifications, and commonly caught species. In addition, socio-demographic information of the fishers was also determined. According to results, the majority of the fishers used bottom set gillnet, single hook and line, and spear gun. The common species caught from all surveyed fishing gears were demersal fish species [rabbitfish (*Siganus* spp.), sweetlips (*Plectorhinchus* spp., *Diagramma* spp.), goatfish (*Mulloidichthys* spp., *Parupeneus* spp.), common silver-biddy (*Gerres oyena*), emperor (*Lethrinus* spp.), and mullet (*Osteomugil* spp.)], pelagic fish species [skipjack tuna (*Katsuwonus pelamis*), frigate tuna (*Auxis thazard*), bullet tuna (*Auxis rochei*), eastern little tuna (*Euthynnus affinis*), giant trevally (*Caranx ignobilis*), and great barracudas (*Sphyraena barracuda*)], octopus, and squid. Fishers were all male with an age range from 21-40 years old, mostly married, and obtained only elementary or secondary education. Most fishers were full-time and engaged in the small-scale fisheries as daily sustenance and source of livelihood.

**Atf bilgisi/Cite as:** Mohammad H.S., Ebbah J.H., Sahiyal K.M. & Tahiluddin A. B. (2022). An assessment of small-scale fisheries in Tandubas, Tawi-Tawi, southern Philippines. Menba Journal of Fisheries Faculty, 8(1), 10-22.

## INTRODUCTION

Globally, the Philippines is recognized as among the top fish-producing countries, ranking 13<sup>th</sup> place in 2018 (FAO, 2020). Marine fishery is a significant protein source, export earnings, and livelihood for the Philippines. In 2018, the total marine fishery production of the Philippines, both from municipal and commercial sectors, was estimated to be 2 million tons, accounting for 47% of the total production of fisheries (BFAR, 2019; Tahiluddin and Terzi, 2021).

Fishing is the main livelihood of coastal dwellers in Tawi-Tawi, southern Philippines due to the fact that Tawi-Tawi is situated in the heart of the coral triangle, the world center of coral reef biodiversity. Muallil et al. (2020) reported that Tawi-Tawi has 266 coral reef fish species belonging to 11 families/subfamilies, 40% more abundant than Palawan or Panay islands, Philippines. The mentioned study was conducted through market surveys. These fish species were caught using different types of fishing gears.

Fishing gears are equipment utilized to capture, gather, or harvest fishery resources from the bodies of water, which are generally categorized into passive or active gears (Baleta et al., 2017; Balisco et al., 2019). Fishing gears are mainly utilized to capture economically valued fishery resources and tend to remove larger ones in a fish population (Law, 2000). The majority of the fishing gears used in municipal waters are usually generated by human effort, while commercial fishing gears are machine-powered, a typical characteristic of tropical reef fisheries (Dalzell, 1996). In Tawi-Tawi, one commonly used fishing gear is the multiple handline, designed to catch small pelagic species like frigate tuna, eastern little tuna, and bullet tuna (Ajik and Tahiluddin, 2021).

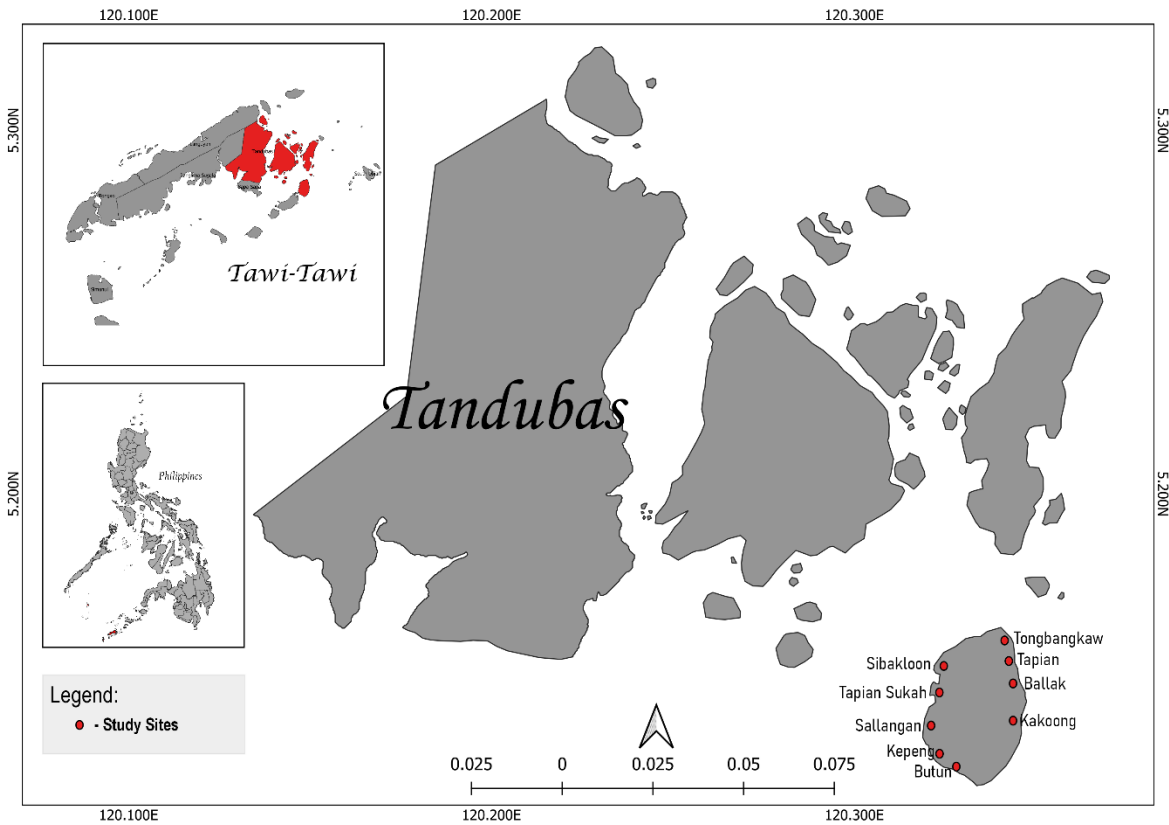
Municipality of Tandubas, Eastern part of Tawi-Tawi Bay, southern Philippines, has considered fishing with various fishing gears as a primary source of livelihood. However, existing study and documentation of fishing gears in Tawi-Tawi is limited. Thus, this study aimed to assess the small-scale fisheries in Tandubas, Tawi-Tawi, southern Philippines. Specifically, it aimed to determine the: 1) commonly used fishing gears and their specifications; 2) commonly caught fish species; and 3) socio-demographic information of the fishers. This study would serve as preliminary information on the status of small-scale fisheries

in the study area. The data would benefit fishers not only in the Philippines but also fishers around the world utilizing fishing gears to capture fish and fishery products sustainably.

**MATERIALS AND METHODS**

**Study Site**

This study was conducted in different 9 villages/barangays (Tongbangkaw, Ballak, Tapian, Sibakloon, Kepeng, Sallangan, Butun, Tapian Sukah, and Kakoong) in the Municipality of Tandubas, Tawi-Tawi, southern Philippines, (Figure 1) from December 20, 2018 to January 18, 2019.



**Figure 1.** Study site.

**Interview**

A household one-on-one interview with 100 fishers was done using the purposive method. A guide questionnaire was used to ask for information such as fishers’ socio-demographic data, type of fishing gears used and their specifications, and species caught.



**Figure 2.** One-on-one interview with the fisher.

## Data Analysis

Data obtained from this study were analyzed using descriptive statistics in Microsoft Excel 2013.

## RESULTS

### Socio-Demographic Data of Fishers

All fishers in the municipality of Tandubas were male, with the majority (92%) married status and mostly (57%) within the age bracket of 21-40 years old. Most of them (90%) finished only elementary and secondary levels. Most of the fishers (93%) were full-time in fishing, while 7% considered fishing as part-time livelihood. Registrations were not quite practiced strictly; hence, majority of them (84%) were not registered fishers (Table 1).

**Table 1.** Demographic information of fishers in Tandubas, Tawi-Tawi, southern Philippines (n=100).

Gender	N	Percentage
Male	100	100%
Female	0	0%
<b>Civil status</b>		
Single	8	8%
Married	92	92%
Widow		
<b>Age (years old)</b>		
11-20	2	2%
21-40	57	57%
41-50	16	16%
51-70	25	25%
<b>Educational attainment</b>		
Elementary	49	49%
Secondary	41	41%
Tertiary	10	10%
<b>Registered fisher?</b>		
Yes	14	14%
No	86	86%
<b>Full-time fisher?</b>		
Yes	93	93%
No	7	7%

### Type of Fishing Gears Used in Tandubas, Tawi-Tawi, southern Philippines

There were 10 types of fishing gears identified in Tandubas, Tawi-Tawi, southern Philippines, which were traditionally used by the fishers such as bottom set gillnet, single hook and line, spear gun, octopus jigger, demersal longline, squid jigger, harpoon, fish trap, troll line and multiple handline with a respective number of users and their percentages (Table 2). All these fishing gears are being used in the municipal waters.

**Table 2.** Fishing gears used by 100 fishers in Tandubas, Tawi-Tawi, southern Philippines (Note: each fisher used multiple fishing gears).

Fishing gears	Number of Users	Percentage
Bottom set gillnet	37	20.11%
Single Hook and line	36	19.57%
Speargun	22	11.96%
Octopus jigger	20	10.87%
Demersal longline	20	10.87%
Squid jigger	18	9.78%
Harpoon	11	5.98%
Fish trap	7	3.80%
Troll line	7	3.80%
Multiple handline	6	3.26%

## Specification of the Fishing Gears

### Bottom set gillnet

The majority of the fishers used bottom set gillnet locally known as *pokot* (Figure 3). The bottom set gillnet used has a mesh size of 25.4-38.1 mm (70.27%), with a cylindrical lead sinker (97.28%) having a 190.5-571.5 mm distance interval (83.78%), and rubber rod-like buoy (94.59%) placed in a distance interval of 190.5-571.5 mm (83.78%). The common bottom set gillnet used PA nylon type (100%) with 5-10 lbs in size (94.57%), which have a length of 50-300 m (67.57%) and a width of 0.3-1.22 m (75.68%).

**Table 3.** Specification of bottom set gillnet used in Tandubas, Tawi-Tawi, southern Philippines (n=37).

Mesh size (mm)	Number of users	Percentage
25.4-38.1	26	70.27%
50.8-63.5	11	29.73%
<b>Type of lead (Sinker)</b>		
Cylindrical	36	97.28%
Circular	1	2.72%
<b>Type of buoy</b>		
Rubber rod like	35	94.59%
Oblong	1	2.70%
Plastic rod like	1	2.70%
<b>Lead distance (mm)</b>		
190.5-571.5	31	83.78%
609.6-635	6	16.22%
<b>Buoy distance (mm)</b>		
190.5-571.5	31	83.78%
609.6-635	6	16.22%
<b>Length (m)</b>		
50-300	25	67.57%
351-600	12	32.43%
<b>Width (m)</b>		
0.3-1.22	28	75.68%
1.52-2.44	8	21.61%
2.74-3.66	1	2.70%
<b>Material</b>		
Nylon	37	100%
<b>Nylon size (lbs)</b>		
5-10	35	94.59%
11-30	2	5.41%



**Figure 3.** Bottom set gillnet (locally known as *pokot*).

### Single Hook and Line

The majority of the fishers used a single hook and line locally known as *passi* (Figure 4) with a length of 10-40 m (61.11%), having a size number of 10-30 lbs (91.67%). It consisted of 1-2 hooks (100%) with J hook type (100%) rolled in circular styrofoam. The common bait used was polychaetes (55.56%) (Table 4).

**Table 4.** Specification of hook and line in Tandubas, Tawi-Tawi, southern Philippines (n=36).

Length of nylon (m)	Number of users	Percentage
10-40	22	61.11%
50-200	14	38.89%
<b>Size of nylon (lbs)</b>		
10-30	33	91.67%
70-120	3	8.33%
<b>Number of hooks</b>		
1-2	36	100%
<b>Types of hooks</b>		
J hook	36	100%
C hook	0	0.00%
<b>Type of baits</b>		
Polychaete	20	55.56%
Hermit crab	13	36.11%
Octopus	1	2.78%
Fish fry	2	5.56%



**Figure 4.** Single hook and line (locally known as *passi*).

### Speargun

Most of the fishers used speargun locally known as *panah* (Figure 5) with a length of 1-1.5 m (68.18%) with size material ranging from 3-7 mm (100%) made from stainless type (81.82%) (Table 5).

**Table 5.** Specification of speargun used in Tandubas, Tawi-Tawi, southern Philippines (n=22).

Length (m)	Number of users	Percentage
1-1.5	15	68.18%
1.6-2.0	7	31.82%
<b>Size of Material (mm)</b>		
3-5	11	50%
6-7	11	50%
<b>Type of Material</b>		
Steel	4	18.18%
Stainless	18	81.82%



**Figure 5.** Speargun (locally known as *panah*).

**Octopus Jigger**

The majority of the fishers used octopus jigger locally known as *kore-kore* with 3 hooks (75%), mostly red (25%) and ivory (25%) in color with 101.6 mm (65%) crab resemblance (45%) attached to a 20-50 m (60%) nylon having size 100 lbs (70%) (Table 6). Different designs of octopus jiggers can be seen in Figure 6.

**Table 6.** Specification of octopus jigger used in Tandubas, Tawi-Tawi, southern Philippines (n=20).

Total number of hook	Number of users	Percentage
3	15	75%
4	2	10%
5	3	15%
<b>Color</b>		
Red dotted black	2	10%
Red dotted white	1	5%
Black yellow	1	5%
Red green	2	10%
Red	5	25%
Green	1	5%
Ivory	5	25%
Yellow	3	
<b>Species resemblance</b>		
Spider	2	10%
Fish	1	5%
Crab	9	45%
Lobster	6	30%
Slipper crab	1	5%
Cattle fish	1	5%
<b>Length of nylon (m)</b>		
20-50	12	60%
60-100	8	40%
<b>Size of nylon (lbs)</b>		
50	4	20%
90	2	10%
100	14	70%
<b>Size of jigger (mm)</b>		
76.2	3	15%
101.6	13	65%
127	4	20%



**Figure 6.** Octopus jigger (locally known as *kore-kore*).

**Demersal longline**

Most of the fishers used demersal longline locally known as *laway-laway* (Figure 7) with a length of 50-100 m (85%), having 50-100 hooks (80%), with a J hook type (100%) attached to a rope with size number of 7-8 lbs (80%). The common type of baits used in demersal longline was fish fry (60%) (Table 7).

**Table 7.** Specification of demersal longline used in Tandubas, Tawi-Tawi, southern Philippines (n=20).

Length of nylon (m)	Number of users	Percentage
50-120	17	85%
121-240	2	10%
241-600	1	5%
<b>Size of nylon/rope (lbs)</b>		
7-8 rope	16	80%
30-120 nylon	4	20%
<b>Number of hooks</b>		
50-100	16	80%
101-250	4	20%
<b>Type of hook</b>		
J hook	20	100%
<b>Type of baits</b>		
Octopus	6	30%
Fish fry	12	60%
Squid	2	10%



**Figure 7.** Demersal longline (locally known as *laway-laway*).

### Squid Jigger

The majority of the fishers used squid jigger locally known as *ullang* (Figure 8) with 22-32 hooks (55.56%) white orange in color (55.56%) attached to a line with a length of 10-15 m (61.11%) having a size number of 15 lbs (55.56%). The common squid jigger used had a prawn resemblance (100%) with a length of 76.2-101.6 mm (55.56%) (Table 8).

**Table 8.** Specification of squid jigger use in Tandubas, Tawi-Tawi, southern Philippines (n=18).

Number of hooks	Number of users	Percentage
12-20	8	44.44%
22-32	10	55.56%
<b>Color</b>		
Blue orange	1	5.56%
Blue white	4	22.22%
Gray white	1	5.56%
White	1	5.56%
White orange	10	55.56%
Dotted color	1	5.56%
<b>Species resemblance</b>		
Prawn	18	100%
<b>Length of nylon (m)</b>		
10-15	11	61.11%
16-30	7	38.89%
<b>Size of nylon (lbs)</b>		
10	6	33.33%
15	10	55.56%
20	2	11.11%
<b>Size of jigger (mm)</b>		
76.2-101.6	10	55.56%
127-152.4	8	44.44%



**Figure 8.** Squid jigger (locally known as *ullang*).

### Harpoon

The majority of the fishers used harpoon locally known as *sahapang* (Figure 9) with a length of 2- 3.5 m (72.72%) having 6 mm of steel/stainless (63.64%) which usually made up of steel (90.91%).

**Table 9.** Specification of harpoon used in Tandubas, Tawi-Tawi, southern Philippines (n=11).

Length (m)	Number of users	Percentage
2.0-2.5	4	36.36%
3.0-3.5	4	36.36%
4.0	3	27.27%
<b>Size of steel/ stainless (mm)</b>		
6	7	63.64%
7	3	27.27%
8	1	9.09%
<b>Material type</b>		
Steel	10	90.91%
Stainless	1	9.09%





**Figure 10.** Harpoon (locally known as *sahapang*).

**Fish Trap**

Most of the fishers used fish trap locally known as *bubu* (Figure 11) with a mesh size of 25.4 mm (42.85%), square in shape (100%), yellow-brown in color (85.71%), and usually made of bamboo (85.71%) with a length of 1 m and a width of 0.8-1 m (100%) (Table 10).

**Table 10.** Specification of fish trap used in Tandubas, Tawi-Tawi, southern Philippines (n=7).

Mesh size (mm)	Number of users	Percentage
25.4	3	42.85%
38.1	2	28.57%
50.8	2	28.57%
<b>Shape</b>		
Square	7	100%
<b>Material type</b>		
Bamboo	6	85.71%
Chicken wire	1	14.28%
<b>Color</b>		
Yellow brown	6	85.71%
Green	1	14.28%
<b>Length (m)</b>		
1	7	100%
<b>Width (m)</b>		
0.8-1	7	100%



**Figure 11.** Fish trap (locally known as *bubu*).

### Troll Line

The majority of the fishers used a troll line locally known as *manitan* (Figure 12) with a length of 50-100 m (57.14%) having a size number of 110-200 lbs (57.14%). It consisted of 1-2 hooks (100%) with J hook type (85.71%) and was commonly baited with artificial bait (71.43%) (Table 11).

**Table 11.** Specification of troll line used in Tandubas, Tawi-Tawi, southern Philippines (n=7).

Length of nylon (m)	Number of users	Percentage
50-100	4	57.14%
200-500	3	42.86%
<b>Size of nylon (lbs)</b>		
50-100	3	42.86%
110-200	4	57.14%
<b>Number of hooks</b>		
1-2	7	100%
<b>Type of hooks</b>		
J hook	6	85.71%
C hook	1	14.28%
<b>Type of baits</b>		
Artificial bait	5	71.43%
Fish fry	2	28.57%



**Figure 12.** Troll line (locally known as *manitan*).

### Multiple Handline

Most of the fishers used multiple handline locally known as *bira-bira* (Figure 13) with a length of 200-500 m (83.33%) consisting of 50-100 hooks (66.67%) with a J hook type (100%) and with a size number of 50-90 lbs (100%). The common bait used for the fishing gear was artificial bait (100%) (Table 12).

**Table 12.** Specification of multiple handline used in Tandubas, Tawi-Tawi, southern Philippines (n=6).

Length of nylon (m)	Number of users	Percentage
51-101	1	16.67%
200-500	5	83.33%
<b>Size of nylon (lbs)</b>		
50-90	3	50%
110-120	3	50%
<b>Number hooks</b>		
50-100	4	66.67%
101-150	2	33.33%
<b>Number of baits</b>		
50-100	4	66.67%
110-120	2	33.33%
<b>Type of hooks</b>		
J hook	6	100%
<b>Type of baits</b>		
Artificial bait	6	100%



**Figure 13.** Multiple handline (locally known as *bira-bira*).

### Common Species Caught using Fishing Gears

The common species caught from all surveyed fishing gears were demersal species like rabbitfish (*Siganus* spp.), sweetlips (*Plectorhinchus* spp., *Diagramma* spp.), goatfish (*Mulloidichthys* spp., *Parupeneus* spp.), common silver-biddy (*Gerres oyena*), monocle/threadfin bream (*Scolopsis* spp., *Pentapodus* spp.), emperor (*Lethrinus* spp.), wrass (*Cheilinus* spp., *Cheilio inermis*), mullet (*Osteomugil* spp.), grouper (*Epinephelus* spp.), silver grunt (*Pomadasys argenteus*), and surgeonfish (*Acanthurus* spp.), pelagic species such as skipjack tuna (*Katsuwonus pelamis*), frigate tuna (*Auxis thazard*), bullet tuna (*Auxis rochei*), eastern little tuna (*Euthynnus affinis*), giant trevally (*Caranx ignobilis*), and great barracudas (*Sphyraena barracuda*), and cephalopods such as octopus (*Octopus vulgaris*) and squid (*Sthenoteuthis oualaniensis*, *Uroteuthis duvaucelii*, *U. edulis*) (Table 13).

**Table 13.** Common species caught of fishing gears.

Fishing gears	Common species caught
Bottom set gillnet	Rabbitfish ( <i>Siganus</i> spp.), Sweetlips ( <i>Plectorhinchus</i> spp., <i>Diagramma</i> spp.), Goatfish ( <i>Mulloidichthys</i> spp., <i>Parupeneus</i> spp.), Common silver-biddy ( <i>Gerres oyena</i> )
Single Hook and line	Monocle/threadfin bream ( <i>Scolopsis</i> spp., <i>Pentapodus</i> spp.), Emperor ( <i>Lethrinus</i> spp.), Wrass ( <i>Cheilinus</i> spp., <i>Cheilio inermis</i> ), Mullet ( <i>Osteomugil</i> spp.)
Speargun	Emperor ( <i>Lethrinus</i> spp.), Rabbitfish ( <i>Siganus</i> spp.), Grouper ( <i>Epinephelus</i> spp.)
Octopus jigger	Common octopus ( <i>Octopus vulgaris</i> )
Demersal longline	Emperor ( <i>Lethrinus</i> spp.) Snapper ( <i>Lutjanus</i> spp.), Silver grunt ( <i>Pomadasys argenteus</i> )
Squid jigger	Purpleback flying Squid ( <i>Sthenoteuthis oualaniensis</i> ), Indian squid ( <i>Uroteuthis duvaucelii</i> ), Swordtip squid ( <i>U. edulis</i> )
Harpoon	Blue-spotted stingray ( <i>Neotrygon kuhlii</i> ), Common octopus ( <i>Octopus vulgaris</i> )
Fish trap	Goatfish ( <i>Mulloidichthys</i> spp., <i>Parupeneus</i> spp.), Mullet ( <i>Osteomugil</i> spp.), Surgeonfish ( <i>Acanthurus</i> spp.)
Troll line	Skipjack tuna ( <i>Katsuwonus pelamis</i> ), Giant trevally ( <i>Caranx ignobilis</i> ), Great barracudas ( <i>Sphyraena barracuda</i> )
Multiple handline	Frigate tuna ( <i>Auxis thazard</i> ), Bullet tuna ( <i>Auxis rochei</i> ), Eastern little tuna ( <i>Euthynnus affinis</i> )

### DISCUSSION

This study revealed that there were various fishing gears operated in the coastal of Tandubas along the eastern Tawi-Tawi Bay, Philippines, for municipal fishing. There were a total of ten fishing gears identified, along with a variety of specifications. Generally, the most dominant fishing gears were lines (single hook and line, multiple hook and line, octopus and squid jiggers, troll line, and multiple handline) used by 58% of the surveyed fishers. Other documented fishing gears were bottom set gillnet (20%), speargun (12%), harpoon (6%), and fish trap (4%).

In terms of specific fishing gear, the most commonly used was hook and lines, either single or multiple hook and lines. This fishing gear was also predominantly used in other parts of the Philippines, like in Isabela province (Baleta et al., 2017). This fishing gear was likewise documented in Palawan province (Balisco et al., 2019). Hook and lines were among the

prevalently used fishing gears in the municipal waters of the Philippines, with more than 62,000 boats landing (Santos et al., 2017). Hook and lines have numerous variations in terms of construction, design, and techniques of operation (Dickson et al., 2004), as also observed in this study. Fishing gears belonging to the category of lines, which is composed of hooks, baits, and lines, are considered the simplest gear used for fishing (Eyo et al., 2000). Some of the advantages of lines and the primary reason for their prevalence are the ease of operation and fabrication, cheapest fabrication cost, and they can be operated in various water depths, either during rainy or summer seasons (Baleta et al., 2017).

Nets are the next most commonly reported fishing gear category in Isabela province, particularly gillnet (Baleta et al., 2017). In Palawan province, nets (e. g., bag net, drift gillnet, beach seine, ring net, and trammel net) were also the most dominant active fishing gear (Balisco et al., 2019). In this study, the bottom set gillnet was the most observed fishing gear based on individual fishing gear. Bottom set gillnet was the most popular municipal fishing gear with the highest catch per unit effort reported in Lingayen Gulf, Philippines (Gaerlan et al., 2018). In Iloilo, central Philippines, bottom set gillnet is one of the popular fishing gears among crabbers (Toring-Farquerabao & Tahluddin, 2022). In all regions of the Philippines, the bottom set gillnets are among the top used fishing gears in the municipal waters, both operated nearshore and offshore, and approximately used by 137,000 boats landed (Santos et al., 2017).

Hand instruments such as speargun and harpoon were documented in this study. Due to its capability to capture fast-moving fish through diving, this speargun was also commonly used by the fishers in the coastal areas of Isabela province (Baleta et al., 2017). In the entire coastal area of the Philippines, speargun is predominantly used by municipal fishers (Santos et al., 2017). Harpoon was one of the hand instruments identified in Isabela province (Baleta et al., 2017).

There was only one barrier and trap identified in this study, which was the fish trap. When compared to the coastal areas of Isabela province, there were two kinds of barriers and traps used by the fishers, which were fish pot/trap and fish pot. In San Miguel Bay, Philippines, stationary fish traps were one of the fishing gears employed by the fishers to catch finfish (Santos et al., 2017).

The catch composition of fishing gears can be influenced by seasonal variation. The most abundant fish family reported along the municipal waters of Palanan, Isabela belongs to Acanthuridae, Sciaenidae, Carangidae, Serranidae, Mugilidae (Baleta and Baleta 2016). Scombridae (tuna and mackerel), Carangidae (caranx and scads), and Acanthuridae (surgeonfish) were the most dominant fish families in four municipalities of Isabela province (Baleta et al., 2017). In the present study, the common species caught using the documented fishing gears were demersal species like rabbitfish (*Siganus* spp.), sweetlips (*Plectorhinchus* spp., *Diagramma* spp.), goatfish (*Mulloidichthys* spp., *Parupeneus* spp.), common silver-biddy (*Gerres oyena*), emperor (*Lethrinus* spp.), and mullet (*Osteomugil* spp.), pelagic fish species such as skipjack tuna (*Katsuwonus pelamis*), frigate tuna (*Auxis thazard*), bullet tuna (*Auxis rochei*), eastern little tuna (*Euthynnus affinis*), giant trevally (*Caranx ignobilis*), and great barracudas (*Sphyrnaea barracuda*), and cephalopods such as octopus and squid. The caught fish is mainly consumed by locals as a protein source or sold in the fish market as a livelihood source. In Scarborough Shoal, the predominant species composition of municipal fishing gears belongs to Balistidae, Acanthuridae, Lethrinidae, and Scombridae (Arceo et al., 2020).

## CONCLUSION

In conclusion, different municipal fishing gears are operated in the coastal water of Tandubas, Tawi-Tawi, southern Philippines. These fishing gears are similar to other places in the country and are intended to catch several marine fish and invertebrates. However, due to a lack of formal education, most middle-aged married fishers only focused on fishing for daily sustenance. Therefore, this study implies that small-scale fisheries in the study area are important in providing local communities with a cheap source of protein and livelihood.

## COMPLIANCE WITH ETHICAL STANDARDS

### a) Authors' Contributions

H. S. M., J. H. E., K. M. S., A. B. T.: Designed the study and interpreted data.

H. S. M.: Performed the survey work.

H. S. M., J. H. E., K. M. S., A. B. T.: Drafted the paper.

### b) Conflict of Interest

The authors declare that there is no conflict of interest.

### c) Statement on the Welfare of Animals

Ethical approval: For this type of study, formal consent is not required

### d) Statement of Human Rights

This study does not involve human participants.

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