

# Fishing Gears in Sarawak: A Preliminary Survey

Mohd Samsul Rohizad Maidin<sup>1,\*</sup>, Nadiyahatul Atikah Harun<sup>1</sup>, Mastura Mustapha<sup>1</sup>,  
Abdullah Abdul Wahab<sup>1</sup>, Daud Norhanida<sup>2</sup> & Musel Jamil<sup>3</sup>

<sup>1</sup> Fisheries Research Institute Kampung Acheh, 32000 Sitiawan, Perak Malaysia

<sup>2</sup> Fisheries Research Institute Batu Maung, 11960 Batu Maung, Pulau Pinang Malaysia

<sup>3</sup> Fisheries Research Institute Bintawa, 93744 Kuching, Sarawak Malaysia

**Abstract.** Unique to Sarawak, the fishing gears double-rig trawl, *paka*, *panau*, and *rantau* were gears that could only be found here. The focus of the present study was to catalog the diversity of fishing equipment across two regions, Wilayah II (Belawai, Daro, Mukah, Sarikei, Sibuan and Tg Manis) and Wilayah III (Bintulu, Lawas, Limbang and Miri), via the interview method. A total of 163 respondents participated in the survey. In Wilayah II, 12 distinct types of fishing gears were identified, with monofilament gill nets (43.90%), fish trawl nets (30.49%), rentang (4.88%), bottom longlines (3.66%), and nylon gill nets (3.66%) being the most prevalent. Less common gears included *paka*, *panau*, shrimp trawl nets, *rentang* for jellyfish, modern *bubu*, and *rantau*. In Wilayah III, 14 different types of fishing gears were recorded, with monofilament gill nets (46.91%) and three-layer shrimp nets (20.99%) being predominant, followed by fish trawl nets (6.17%) and shrimp trawl nets (6.17%). Other less dominant gears included modern *bubu*, *panau*, *rantau*, nylon gill nets, and bottom longlines. The mesh sizes of monofilament gill nets in both regions ranged from 25 to 170 mm, adhering to the regulations and guidelines set by the Department of Fisheries, Malaysia.

## 1 Introduction

There are various techniques for capturing fish and other aquatic resources, whether employing gear or not, have long been practiced across numerous countries, including Malaysia. A fishing gear is a tool used for capturing aquatic resources, while the fishing method describes how the gear is utilized. The basic principles of fishing gears including water filtration, attracting and tricking the prey and hunting. Fishing gear and methods are typically classified by how they catch fish or other prey, with lesser emphasis on construction or materials of the gear. However, the gears and methods used today have undergone significant transformation over time, especially with the invention of synthetic materials and electronic devices. Modern fishing techniques catch fish more effectively than in ancient times, but certain fishing gear can harm fragile habitats like coral reefs and seagrass beds.

---

\* Corresponding author: [samsulrohizad@dof.gov.my](mailto:samsulrohizad@dof.gov.my)

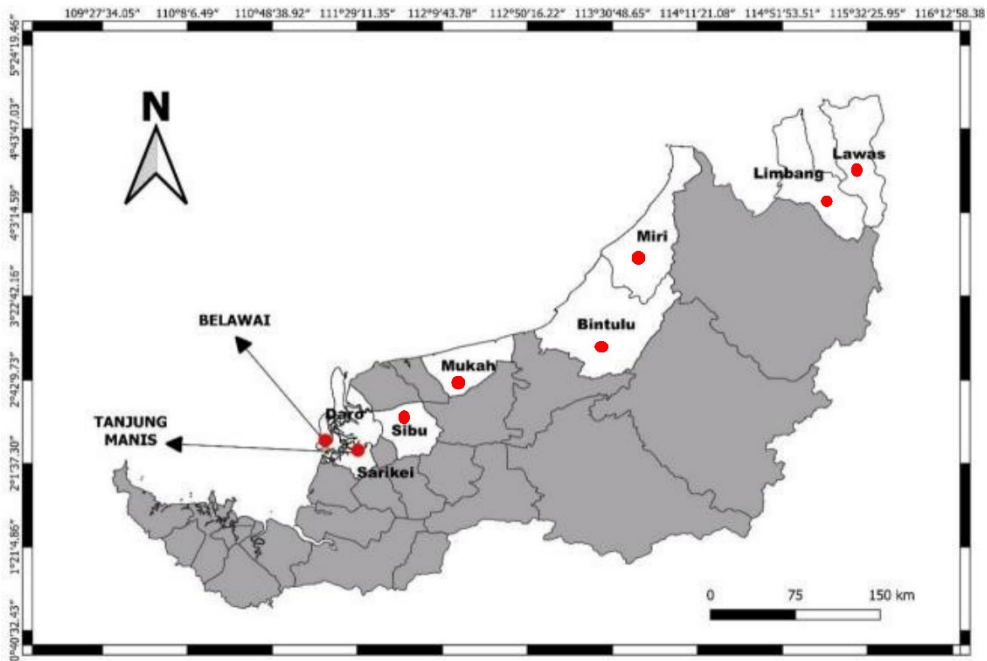
This degradation causes disturbances in ecological systems that store carbon and support biodiversity, consequently impacting the stability of the climate.

A total area of 548,800 km<sup>2</sup> was claimed as Exclusive Economic Zone (EEZ) by Malaysia. Peninsular Malaysia comprises the largest portion, covering 55% of this area, while Sabah accounts for 16% and Sarawak for 29%. Collectively, Malaysia's EEZ constitutes approximately 69% of its coastal waters. The Fisheries Comprehensive Licensing Policy (FCLP) further categorizes Malaysia's fishing waters into four distinct zones: Zone A spans from the shoreline 0 to 5 nautical miles (nm), Zone B covers 5 to 12 nm, Zone C extends from 12 to 30 nm, and zone C2 includes areas beyond 30 nm. According to [1], in 2022, the state of Sarawak registered a total of 4,991 vessels, with Zone A housing the majority at 4,514 vessels. Zones B and C reported 54 and 384 vessels, respectively, while Zone C2/C3 had the fewest registered vessels, with just 37. Normally, each zone employs distinct fishing gear.

The utilization of fishing gear can vary significantly among different fishers, leading to distinct differences between the fishing gears used in Sarawak and those in Peninsular Malaysia. Unique to Sarawak, gears like the double-rig trawl, *paka*, *panau*, and *rantau* are only available there. Additionally, certain terms differ regionally; for instance, nylon nets called *jaring nilon* in Peninsular Malaysia are referred to as *rantau* in Sarawak. According to a study by Fisheries Research Institute Bintawa [2], five types of gear are used to capture Acetes in Sarawak: Beach Push Net (*Songkor*), Small Purse-seine Net (*Lengkong*), Scoopnet (*Sobor*), Scoop-seine Net (*Ancau*), and Beam Trawl (*Paka Tunda*). To date, there is no current data reported on all types of fishing gears in Sarawak. Thus, this study aims to systematically identify, document, and classify the diverse fishing gears currently used in two regions of Sarawak: Wilayah II and Wilayah III.

## 2 Materials and method

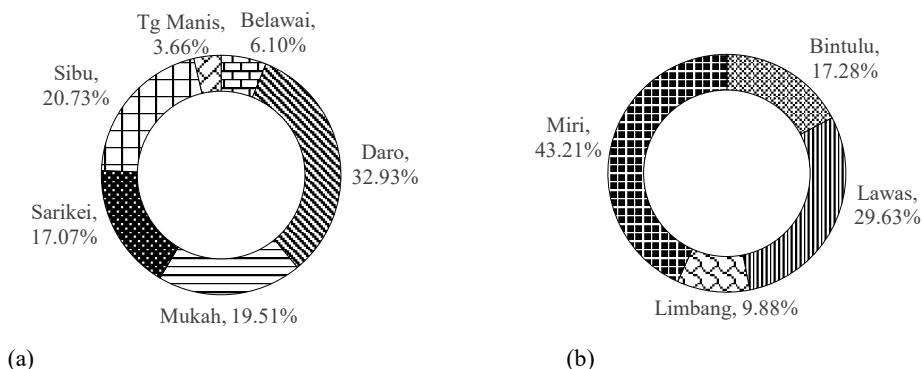
The survey was conducted in Wilayah II and Wilayah III of Sarawak, encompassing several districts and divisions including Lawas, Limbang, Miri, Bintulu, Mukah, Sibul, Daro, Sarikei, Belawai, and Tanjung Manis (Figure 1). The survey period spanned from January 2023 to December 2023. A structured questionnaire was designed to collect pertinent data from respondents on fishing practices, gear usage, vessel information, and specifications of fishing gear. Detailed information about the fishing gears used by the respondents was meticulously recorded, covering various types such as nets, trawls, lines, traps, and others. Cross-checking of data was made with Fisheries District Office, and all the data were tabulated and subjected to descriptive analyses using Microsoft Excel.



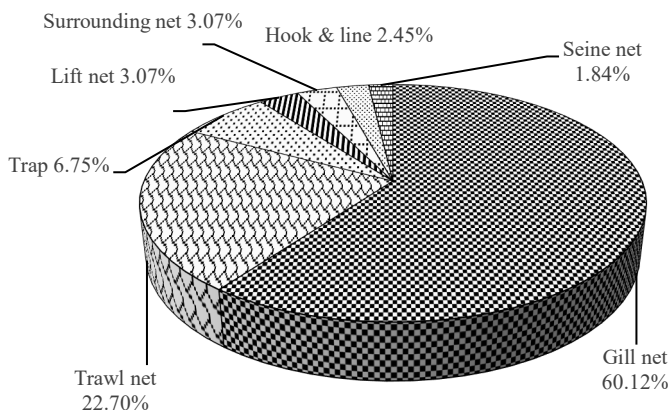
**Fig. 1.** Sampling stations of the survey on fishing gear in Sarawak.

### 3 Results and Discussion

A total of 163 individuals involved in fishing activities within the study areas were interviewed. Figure 2 presents the distribution of respondents across Wilayah II (a) and Wilayah III (b) in Sarawak. In Wilayah II, Daro reported the highest percentage of respondents at 32.93% (n=27), followed by Sibui at 20.73% (n=17), Mukah at 19.51% (n=16), Sarikei at 17.07% (n=14) and Belawai at 6.10% (n=5). Tanjung Manis had the lowest percentage at 3.66% (n=3). In Wilayah III, Miri had the highest percentage of respondents at 43.21% (n=35) followed by Lawas at 29.63% (n=24) and Bintulu at 17.28% (n=14). Limbang recorded the lowest at 9.88% (n=8). According to [1], Sarawak had an estimated 10,397 registered fishers in 2022, distributed across various zones: Zone A with 7,275 fishers, Zone B with 303, Zone C with 2,321, and Zones C2/C3 with 498. The respondents in the present study represented only 3.18% of the total registered fishers in Sarawak, specifically in Wilayah II and III. Although this preliminary survey may not encompass all fishing gear types used in Sarawak, it offers an initial overview. Notably, the survey locations namely Sibui, Mukah, and Miri aligned with those in previous studies carried out by [3].



**Fig. 2.** Percentage of respondents in Wilayah II (a) and Wilayah III (b) in Sarawak.



**Fig. 3.** Percentage of fishing gear design in Wilayah II and III in Sarawak.

In Wilayah II and III of Sarawak, 7 categories of fishing gear were observed, with the gill net being the most predominant, contributing to 60% of the total fishing gear utilized (Figure 3). The remaining six fishing gear consist of the Trawl line (22.7%), Trap (6.75%), Lift net (3.07%), Surrounding net (3.07%), Hook & line (2.45%), and Seine net (1.84%). Artisanal fishers favor gill nets due to their effectiveness that can be fished throughout the year compared to other traditional fishing gear in catching most type of fish species [4-5]. The findings presented in the survey are in line with the information provided by [1], indicating that gill nets have the highest number of vessels in Zone A with a total of 30,169 vessels, compared to other types of fishing gear. Consequently, it can be observed that gill nets have emerged as the dominant choice for fishing activities achieving the highest marine fish landings recorded at 34,036 metric tons closely followed by trawl nets which reported a total of 33,630 metric tons of marine fish landings [1].

Table 1 lists the various fishing gear designs in Wilayah II and III of Sarawak. This survey identified 18 types of fishing gear across seven categories: four types of traps, two types of lift nets, two types of seine nets, four types of gill nets, three types of surrounding nets, two types of trawl nets, and one type of hook and line. The surveyed gear categories were

ranked by frequency, revealing that gill nets were the most prevalent, followed by trawl nets, traps, lift nets, surrounding nets, hook and line, and finally seine nets. These findings underscore the diversity and distribution of fishing gear used in Sarawak. Additional types of fishing gear would likely be identified if the survey covered all regions of Sarawak. Notably, [3] reported the use of bottom double rigging for targeting shrimp and demersal fish in Sarawak, a gear type not found in the present study.

**Table 1.** List of Frequency, Percentage and Rank by fishing gear design observed in Sarawak.

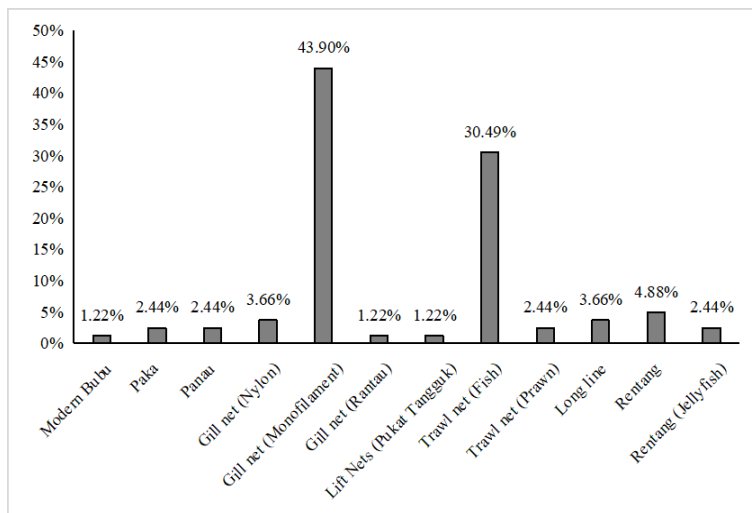
Gear	Frequency	Percentage (%)	Rank
<b>Trap</b>	<b>11</b>	<b>6.7</b>	<b>3<sup>rd</sup></b>
Portable trap ( <i>Bubu</i> )	3	1.8	
Stow net ( <i>Paka</i> )	2	1.2	
Stow net ( <i>Rentang</i> )	4	2.5	
Stow net (jellyfish) ( <i>Rentang obor</i> )	2	1.2	
<b>Lift net</b>	<b>5</b>	<b>3.1</b>	<b>4<sup>th</sup></b>
Lift net ( <i>Panau</i> )	4	2.5	
Lift net (squid) ( <i>Pukat tangguk sotong</i> )	1	0.6	
<b>Seine net</b>	<b>3</b>	<b>1.8</b>	<b>7<sup>th</sup></b>
Seine net ( <i>Pukat tarik</i> )	2	1.2	
Beach seine ( <i>Pukat tarik pantai</i> )	1	0.6	
<b>Gill net</b>	<b>98</b>	<b>60.1</b>	<b>1<sup>st</sup></b>
Gill net (monofilament) ( <i>Pukat tangsi</i> )	74	45.4	
Gill net ( <i>Pukat rantau</i> )	3	1.8	
Trammel net ( <i>Pukat udang tiga lapis</i> )	17	10.4	
<b>Surrounding net</b>	<b>5</b>	<b>3</b>	<b>5<sup>th</sup></b>
Purse seine ( <i>Pukat jerut</i> )	1	0.6	
Small purse seine (fish) ( <i>Pukat lengkong ikan</i> )	2	1.2	
Small purse seine (shrimp) ( <i>Pukat lengkong udang</i> )	2	1.2	
<b>Trawl net</b>	<b>37</b>	<b>22.7</b>	<b>2<sup>nd</sup></b>
Trawl net (Fish/Squid) ( <i>Pukat tunda ikan/sotong</i> )	30	18.4	
Trawl net (Prawn) ( <i>Pukat tunda udang</i> )	7	4.3	
<b>Hook &amp; line</b>	<b>4</b>	<b>2.5</b>	<b>6<sup>th</sup></b>

Bottom longline (*Rawai dasar*) 4 2.5

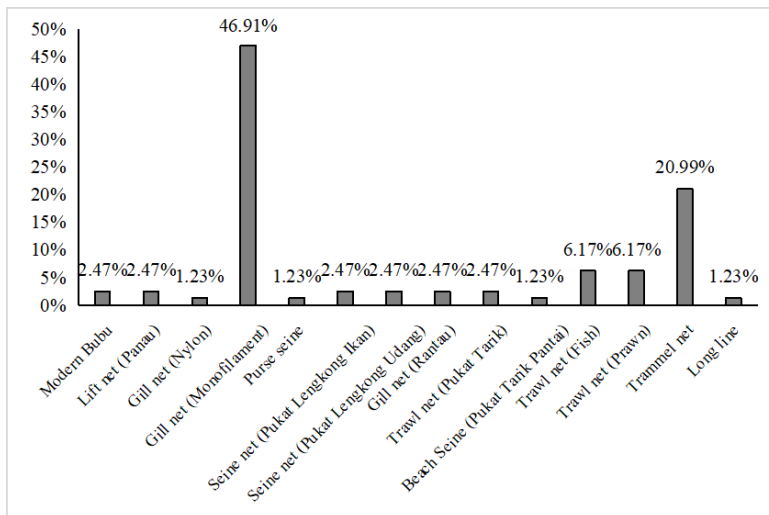
**Table 2.** Comparison of main species caught, mesh size, and cod end size of available fishing gear in Sarawak.

Gear	Present survey			Rosidi (2002)		
	Main caught species	Mesh size (mm)	Cod end size (mm)	Main caught species	Mesh size (mm)	Cod end size (mm)
Gill net	Pomfret, Threadfin, Spanish mackerel, Mackerel tuna, Croaker, Stingray, Red snapper, Bigeye ilisha, Shrimp	25-190	N/A	Spanish mackerel, Indo pacific mackerel, Pomfret, Seabass	52-170	N/A
Trawl net	Hairtail, Croaker, Squid, Shrimp	N/A	38-51	Demersal fish, Shrimp	1-25	20-30
Trap	Grouper, Red snapper, Crab, Bombay duck, Jellyfish, Shrimp	25-44	38	Shrimp, Bombay duck, Longtail anchovy	25	N/A
Lift net	Pomfret, Squid	25-44	13-51	Herring, Bigeye Ilisha, Bombay duck, Black pomfret	30-70	25
Surrounding net	Pomfret, Herring, Shrimp	13-25	13	Scad, mackerel, Black pomfret	N/A	25
Hook & line	Stingray, Baraccuda	N/A	N/A	Jack, Trevally, Cavalla, Grouper, Stingray, Shark	N/A	N/A
Seine net	Croaker, Shrimp	83	19	Black pomfret, Hardtail scad	N/A	25

Table 2 compares the main species caught, mesh sizes, and cod end sizes of various fishing gear types in Sarawak. The research demonstrates that all fishing gear effectively captures a diverse range of fish species due to their respective sizes. The cod end sizes for trawl nets used in this survey fully comply with Section 8(b) of the Fisheries Act 1985, which mandates a minimum of 38 mm. This rule only applied to trawl net and not for others. This compliance ensures that the fishing gear adheres to specified standards and guidelines, promoting sustainable fishing practices and protecting marine resources. The variation in mesh sizes among different types of fishing gear observed in this survey closely mirrors findings from a similar study conducted by [6] in the Tulsiganga River, Bangladesh.



(a)



(b)

**Fig. 4.** Types of fishing gears used in Wilayah II (a) and Wilayah III (b), Sarawak.

Figure 4 illustrates the distribution of fishing gear types in Wilayah II and Wilayah III, Sarawak. In Wilayah II, 12 types of fishing gear were recorded. Monofilament gill nets were the most prevalent at 43.90% (n=36), followed by fish trawl nets at 30.49% (n=25), reantang at 4.88% (n=4), and both longlines and nylon gill nets at 3.66% (n=3) each. In Wilayah III, 14 types of fishing gear were identified. Monofilament gill nets dominated at 46.91% (n=38), followed by trammel nets at 20.99% (n=17), and both fish trawl nets and shrimp trawl nets at 6.17% (n=5) each. These findings indicate that monofilament gill nets are the predominant fishing gear in both Wilayah II and III. Classified as conventional fishing gear, gill nets face no operational restrictions, unlike commercial fishing gear such as trawl nets and purse seine gear, which are limited to Zones B, C, and C2. This regulation aims to shift high-capacity fishing operations offshore, conserving coastal aquatic resources and preventing overfishing [7]. The lengths of gill nets found in this study ranged from a minimum of 18.29 meters (Monofilament gill nets) to a maximum of 7,408 meters

(Multifilament gill net or *rantau*). As demonstrated by [8], *rantau* has been present in Sarawak and has been used by fishers from the late 1980s to the present. The results of the present study also in line with [9-10] which proved that variety of fishing gears including *panau*, gill nets, trawls and traps were recorded in 1980s until 2020. It is evident that these fishing gears have been used for generations, making it essential to document and record them in order to identify any modifications made over time.

## 4 Conclusion

The present study revealed a diverse array of fishing gear used by fishers in Wilayah II and III of Sarawak. This survey did not encompass all fishing gear specifications used throughout Sarawak. The variety of fishing gear employed by fishers varied based on their location and designated fishing zones. Notably, the maximum length of fishing gear, identified as *rantau*, was consistent in both regions. The sizes of the cod end mesh sizes were verified to comply with regulations established by the Department of Fisheries (DOF), as did the mesh sizes of the fishing gear. This survey provides baseline information for fishery managers and stakeholders to manage fishing gear specifications effectively. Poor management could result in discarded or lost gear (ghost gear) continuing to trap and harm marine life, impacting the carbon cycle and influencing climate stability.

Acknowledgement: The authors would like to thank the Department of Fisheries Sarawak (JPLS) for funding this survey. We are also grateful to all the staffs of JPLS, FRI Bintawa, Nurridan Abd Han, Fatin Nabilah Yaman, Rozita Hani Safiei, Fikrihazailie Alias, Balqis Mohd Zahis, Syahmi Ramli and all the fishers involved for data collection in this survey.

## References

1. Department of fisheries, Ann. Fish. Stat. Vol. I Kuala Lumpur: Government press, Ministry of Agriculture and Food Security (2022)  
<https://www.dof.gov.my/sumber/perangkaan-perikanan-i/>
2. M. Jamil, H. H. Mohammad, R. Hadil, Y. Sharum, K. Buniamin, A. Arfazieda, Fishing gears of Acetes in Sarawak. Fisheries Research Institute Bintawa (2019)
3. A. Rosidi, Fishing gear and methods in Southeast Asia: Malaysia. (Marine Fishery Resources Department and Management Department, SEAFDEC) (2002)
4. N. Haryati, M. Sharir, M.R.M. Ariff, S. Safiai, Determination of the technical efficiency of different types of gill net in Malacca, Journal of Southeast Asean Study (JATI).**17**,133-154 (2012).
5. J.E. Eyo, C.I. Akpati, Fishing gears and fishing methods in Proceedings of the UNDP-Sponsored Training Workshop on Artisanal Fisheries Development, University of Nigeria, Nsukka, October 29 – November 12 (1995)
6. A.K. Paul, S. Ray, M.S. Islam, S.K. Bashak, N.M. Noor, M. De, S.K. Das, A survey on variation and availability of fishing gear and craft in Tulsiganga river, Bangladesh. AACL Bioflux **12**(1) 230 - 238 (2019).
7. Y. Ogawa, Marine Fisheries Management and Utilization of Fishing Ground in Malaysia, JARQ **38** (3), 209 -212 (2004).
8. S.C. Pang, Traditional Fishing Activities in the Mangrove Ecosystems of Sarawak (Department of Fisheries, Ministry of Agriculture, Malaysia, WP Kuala Lumpur, 1989)
9. M. Mohamed Ibrahim, The Malaysian fishing gears and methods, Theses and Major papers, University of Rhode, Island (1980)

10. D. Sukri, A.W. Zainudin, W.R.W.M, Luqman, Y. Sharum, M. Jamil, T. Johari, A. A. Wahab, M.N. Nummeran, I. Faizah, Z.N. Khalilah, R.M.F. Anwar, Y.M. Fakhrudin, A.B. Sumawati, M. Khairuddin. Peralatan Penangkapan Ikan Di Malaysia (Jabatan Perikanan Malaysia, 2020)