



## ECOFRIENDLY CHARACTERIZATION OF TRAMMEL NET IN FOR SUSTAINABLE FISHERIES IN PANGANDARAN DISTRICT

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### KeyWords

trammel net, eco friendly, sustainable fisheries, Pangandaran, catches, environment, fishing gear

### ABSTRACT

This study aims to determine the level of eco-friendliness of trammel net fishing based on catches in Pangandaran District. Data collection was carried out in Juni-October 2017. Analysis of the data included the composition of the catch, the size of the catch, the size of the main catch, and the utilization of the catch. The results showed that the main catches on the trammel net fishing gear in Pangandaran District were *Penaeus merguensis* and *Metapenaeus ansis* with a proportion of 54%, while on the side results of *Parapenaeopsis sculptilis*, *Metapenaeus brevicornis*, *Penaeus monodon*, *Sepia* sp and others with a proportion of 42%. The size of the main catch on the trammel net fishing gear shows that the proportion of 87% captures more than length of maturity size and the proportion of 13% of the catch that has not yet reached the mature size while the utilization of catch shows a proportion of 98%. The results of the accumulation of environmental friendliness assessment on trammel net fishing gear in Pangandaran District amounted to a score of 10, with the category "eco friendly").

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## PENDAHULUAN

Pangandaran is one of the districts in West Java that has potential in the field of capture fisheries and tourism in Indonesia. Pangandaran waters have a large potential of marine biological resources, this can be seen from the condition of the waters that are directly related to the Indian Ocean affecting the oceanic characteristics of these waters. Actually the existence of these two potential sectors is a comparative advantage for Pangandaran Regency to increase the economic passion of the region. The fact is that the development of these two sectors has not been optimally integrated, if not managed properly, tourism can have a negative impact on the fisheries sector, especially for fishermen (Hafidz 2016).

The capture fisheries industry has been identified as a cause of stock decline, mainly due to fishing mortality and the size selectivity of fish caught (Jorgensen, Ernande and Flksen 2009). Tropical fisheries resources such as in Indonesia are combined or multispecies in a complex ecological system (Zulbainarni, et al. 2011). Various capture fisheries activities have been carried out without control in the use of fish as the purpose of capture. Some research results indicate that marine fish resources have experienced considerable pressure and resulted in a decline in the quality of resources, both population, number of catches and the condition of ecosystems which are fish habitat (Fauzi 2010).

Trammel net is an alternative means of trawling replacement which is often found operating in Indonesian waters to catch shrimp. The productivity of these nets is lower than trawling, but the ownership of these nets by fishermen has shown a significant increase in numbers. The increase in the number of trammel net, especially in the waters of the North coast of Java and the Straits of Malacca, is due to the fact that these fishing gears are relatively cheap and easy to operate and the main catches are *Penaeus merguensis*, *Penaeus monodon*). By-catch and the capture of below-sized target fish as a result of non-selective use of fishing gear have become a major problem in the world of fishing today. The selectivity process is very important as a conservation effort and the recruitment process for existing natural resources so that young fish can stay alive and produce (Purbayanto and Sondita 2000).

One way to improve fishery products without damaging the sustainability of fisheries biological resources is to use selective fishing gear, according to the fishing area where the tool is operated. The application of fishing technology with selective fishing gear is the main thing in the management of fish resources, so as to maintain the sustainability of fish populations in the waters. This study aims to determine the level of hospitality of trammel net fishing equipment used in Pangandaran District.

## RESEARCH METHODS

This research was conducted at the location at the Pangandaran Fish Landing Base (PPI), West Java, in September-October 2017. The method used in the study was purposive sampling method. Analysis of environmental friendliness is assessed based on the composition of the type, size, and utilization of the catch. The primary data collected directly during the study were the amount of production (weight), composition and proportion of catch species, proportion of utilization of catch and length at first maturity. Based on the target of capture from fishermen, the main catch (HTU) and by-products (HTS). Utilization is calculated by identifying the catches that are sold and consumed (used) and the catches that are disposed (not utilized). Fork length measurements are carried out to determine the biological feasibility of the catch caught according to the length of the gonad ripe (length at first maturity).

### Data analysis

Analysis of environmental friendliness on Trammel net fishing gear is assessed based on the composition of the type, size and utilization of the catch. Based on the fishing target, the catch is divided into catches of the main target (HTU) and by-products (HTS). Utilization is calculated by identifying the catches that are sold and consumed (used) and the catches that are disposed (not utilized).

### Proportion Analysis and Composition of Types of Catches

The proportion of catches of main and side targets, each data amount and weight of the catch of the main target (HTU) and by-catch or HTS. Rare species or protected by law are also included in the by catch category of fishing operations calculated in percentage terms (Takwin, 2005).

### Size Composition Analysis of the main catches

The proportion of biologically viable fish is known based on the size of the fish fork that first gonads mature. Fish fork length data captured by the main target for each fishing gear are processed by calculating the frequency distribution. Furthermore, comparing

the data of main fish fork lengths that were caught during the study with gonad rake lengths or length at first maturity. Furthermore, the proportion of the main catch of fish is feasible to be biologically captured.

### Analysis of Composition of Utilization of Catches

Based on utilization, the main catches are divided into two groups, namely the main catches that are used and those that are not utilized. Side catches are also divided into two groups as well, namely by-products that are used and which are not utilized. All captured data (Ht) is compared with the discarded catch in proportion to the formula:

- The proportion of results utilized (%) =  $\frac{\text{Ht is utilized}}{\text{Amount of Catch}} \times 100\%$

- Unused proportion (%) =  $\frac{\text{Ht that is not utilized}}{\text{Amount of Catch}} \times 100\%$

### Level of Environmental Friendly Capture Tool

According to Mallawa (2006) and Syamsudin (2008) factors of the environment can be used as assessment of environmental friendliness to see on a fishing unit among others result from data and awarding score on the criteria of hospitality fishing tools environment that is broken down into four (4) sub criteria refers to the opinion of the Monitja (2000) which is useful for easy assessment of the capture tool. The assessment is done in the following way (table 1):

Table 1. Assessment Of The Level Of Environmental Friendliness

Environmental Friendly Factor	Indicator	Indicator	score
I. Number of main catches (%)	81-100	Very eco friendly	4
	61-80	Eco friendly	3
	41-60	Less eco friendly	2
	1-40	Not eco friendly	1
II. Size of main catch (length at first maturity) (%)	81-100	Very eco friendly	4
	61-80	Eco friendly	3
	41-60	Less eco friendly	2
	1-40	Not eco friendly	1
III. Utilization of catch (%)	81-100	Very eco friendly	4
	61-80	Eco friendly	3
	41-60	Less eco friendly	2
	1-40	Not eco friendly	1

Source: Mallawa, 2006

Furthermore the number of results overall score accumulated to determine the level of Environmental friendliness of fish tool (Tabel 2).

Table 2. Assessment of Overall Level of Environmental Friendliness

No	Jumlah Skor	Kriteria
1	3-5	Not eco friendly
2	6-8	Less eco friendly
3	9-11	Eco friendly
4	12	Very eco friendly

Source: Mallawa, 2006

## RESULTS AND DISCUSSION

### Fishing Equipment and Environmental Friendly Level of Fishing Equipment

The type of fishing gear operated by Pangandaran fishermen varies according to the type of target fish caught. Fishermen in Pangandaran District, one fisherman family has an average of more than one type of fishing gear. Most fishermen operate their fishing gear using a fleet of motor boats measuring <5 GT and according to the type of fishing gear used. The types of fishing gear in Pangandaran District include: gill nets, three layers of dogol nets, beach trawls, and longline fishing (Table 3). The type of gill net fishing equipment is the dominant fishing tool owned by fishermen in Pangandaran District.

Table 3. Types of fishing gear operating in Pangandaran District

No	type of fishing gear	Total (unit)
1	Jaring Insang ( <i>gill net</i> )	2.069
2	Jaring tiga lapis ( <i>trammel net</i> )	305
3	Jaring Dogol	21
4	Pukat Pantai	23
5	Pancing Rawai	50

Source: Bidang Perikanan Tangkap DKPKP Kab. Pangandaran tahun 2016

### Composition of Types of Catches of Trammel Net

The catch of trammel net fishing equipment in Pangandaran District dominated by white because the main target of the trammel net fishing gear was *Penaeus merguensis* and *Metapenaeus tenuipes*. In accordance with the statement from Iskandar (2009) that the trammel net catch is dominated by white shrimp which is the target of fishing.

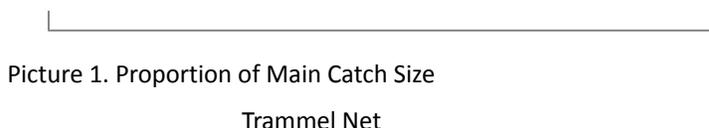
Table 4. The catch netted three layers (trammel net)

Spesies	weight (kg)	Sub-total (kg)	%	
Udang Jerbung ( <i>Penaeus merguensis</i> )	24.16			
Udang Dogol ( <i>Metapenaeus ansis</i> )	29.92	54.08	58.4	HTU
Udang Krosok ( <i>Parapenaeopsis sculptilis</i> )	15.96			
Udang Tepus ( <i>Metapenaeus brevicornis</i> )	4.9			
Udang Windu ( <i>Penaeus monodon</i> )	1.332	36.662	41.6	HTS
Sotong ( <i>sepia sp</i> )	10.11			
Campuran	4.36			
<b>Total</b>	<b>90.74</b>	<b>90.74</b>	<b>100</b>	

Based on the results of the study, it can be seen in Table 4 the proposition of species composition of catches in Pangandaran shows that net trammel fishing equipment is quite good at capturing the main target compared to the side catch (by catch). This can be interpreted that the trammel net fishing gear is very selective in capturing the type of shrimp and will increase the level of friendliness of the environment of the fishing gear.

### Composition of the Size of the Main Catch of Trammel Net

Individual size is one indicator to determine the age of an individual and his reproductive biology indicators. Fish biology data is one of the four main types of data needed in the framework of implementing fisheries management measures (Masuswo and Widodo 2016). Catching the size of the first gonad ripe fish can provide an opportunity for catch target fish to be able to reproduce and spawn before being caught, so that the process of recruitment of small fish phases into adult fish phases can work (Laevastu and Hayes, 1981 in Maulidin, 2011).



Picture 1. Proportion of Main Catch Size

The main catches on the net trammel net operated in Pangandaran are jerbung shrimp and dogol shrimp. A total of 32 jerbung shrimps were sampled at the time of the study to measure carapace length, showing a range of sizes between 3.5 cm -9.7 cm. According to Kembaren (2013) the size of the first gerbad ripe shrimp was at 3.9 cm carapace length with this statement showing that the jerbung shrimp that had reached the first size matured gonad (Lm) were 24 tails (75%) and the jerbung shrimp had not reached the size of the first gonad mature (Lm) as many as 8 tails (25%). Different from the size of dogol shrimp, according to Suman (2005) the first dogol shrimp cooked gonad is 3.18 cm in size, thus it can be stated that dogol shrimp that are caught entirely have reached more mature size of gonad (Lm) 100% due to the length of carapaks in shrimp dogol caught in the range 4.1 cm -8.1 cm. The results of data analysis on the composition of the main catches on three-layer net fishing gear (trammel net) used by Pangandaran fishermen consisting of jerbung shrimp and dogol shrimp are almost average overall catch exceeding the size of the first gonad ripe

### The Composition of The Catch Utilization Trammel Net

The catch that is not utilized or disposed of at sea has an average (2 kg or 17 tails), with a value not utilized 2%. The catches that are disposed of at sea are usually catches that are relatively small in size and their body shape has been destroyed eaten by other fish during the immersion of trammel net fishing gear. This can show that the utilization of trammel net catches is utilized optimally, the following is the utilization of trammel net catches as presented in Table 5

Table 5. Utilization of Three Layer Net Catches

	Utilized			Not Utilized	
	On sale	Consumed	%	Discarded	%
<b>weight (Kg)</b>	89.5	4.6	98	1.4	2.0
<b>Total (Tail)</b>	3296	91	99	29	0

### Penilaian Tingkat Keramahan Alat Tangkap Trammel Net

Analysis of the level of environmental friendliness of each fishing gear sampled during the study was conducted to determine the level of friendliness of the environment of the five fishing gear in order to realize sustainable fisheries capture in accordance with the provisions of responsible fisheries implementation. An fishing unit is classified as eco friendly if the fishing gear has fulfilled the environmental factors of fishing gear. The following is an assessment of the level of hospitality of Trammel Net fishing gear in Table 6

Table 6. Assessment of Environmental Friendly Levels on Three-Layer Nets

Environmental Friendliness Factor	Indicator	Criteria	score
Composition of species of catch	58,4 %	less eco friendly	2
Fish Size Main Catch (Length at First Maturity)	87 %	Very Eco Friendly	4
Utilization of Catches	98 %	Very Eco Friendly	4
<b>Total</b>		<b>Eco friendly</b>	<b>10</b>

The results showed the lowest score in the proportion of the main catches worth 2 while Based on the length of the catch, the three-layer net provided a proportion that was quite good with a value of 4, of the total fish caught had exceeded the size (Lm). The utilization rate of this fishing gear is also quite maximal 4, because almost all of the catches obtained by the fishermen are used by means of being sold in high economic value. This shows that the trammel net fishing gear has a score of 10 which means that this fishing gear has the criteria of "Eco Friendly".

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### Conclusion

The results of the study on the level of environmental friendliness of trammel net fishing equipment in Pangandaran District based on catch selectivity worth 10 means that it can be concluded that trammel net fishing gear is categorized as an eco friendly fishing gear.

## References

- [1] Fisheries, Marine and Food Security Department of Pangandaran Regency. 2016. *Pangandaran Regency Fisheries Statistics Year 2016*. Annual Report, Pangandaran: Fisheries, Marine and Food Security Agency of Pangandaran Regency.
- [2] Fauzi, A. 2010. *Fisheries Economy. Theory, Policy and Management*. PT. Gramedia Utama. Jakarta. 224 pp.
- [3] Iskandar, D. 2009. Comparisson of Catch Using *Lapdu*, *Giltong* and Trammel Net at Saengga Teluk Regency. Faculty of Fisheries and Marine Sciences. Bogor Agricultural Institute. *Jurnal* Vol. 6, No. 1, 2010, 22 – 29
- [4] Mallawa, A.2006. Estimation Study of Fisheries Resources and Marine at Selayar. Universitas Hasanudin, Faculty of Fisheries and Marine Sciences, Makasar. 211 pp.
- [5] Masuswo, Rudi, and Agustinus Anung Widodo. 2016. Characterization of Biology for *Euthynnus affinis* chatced by gill net in Java Sea." *Bawal* 8 (1): 57-63
- [6] Maulidin, F. 2011. Ecological Friendly Fishing of Purse siene based of catch landed in Pusong Lhokseumawe. Thesis. Faculty of Fisheries and Marine Sciences Universitas Padjadjaran, Jatinangor.
- [7] Monintja, D.R. 2000. Utilization of the Sea Coast for Capture Fisheries Activities. Proceedings of the Training for Management of Integrated Coastal Areas. Bogor: PKSPL IPB. 45-57
- [8] Monintja, D. 1989. Introduction to Capture Fisheries in Indonesia. Departement of Fisheries Resources Utilization. Bogor Agricultural Institute, Bogor.
- [9] Takwin. 2005. The main and bycatches of the Payang fishing unit at Pelabuhan Ratu Sukabumi. Thesis. Departement of Fisheries Resources Utilization. Bogor Agricultural Institute, Bogor.
- [10] Purbayanti, Ari, and Riyanto. 2005. Operation of Shrimp Trawlers on Day and Night Effects on Side Capture in the Arafura Sea. *Maritek* 5 (1): 29-41.
- [11] Zulfainarni, Nimmi, Mangara Tambunan, Yusman Syaukat, and Achmad Fahrudin. 2011. Multispecies Exploitation Bioeconomy Model Of Pelagis Fisheries Resources In The Balance Of Bali. *Marine Fisheries Journal* 141-154.

