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Environmentally Friendly and Sustainable Fisheries Catch Skipjack Tuna (Kat*suwonus Pelamis Linneus)* in Tomini Bay, Gorontalo Province

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A B S T R A C T
Environmentally Friendly and Sustainable Catching Fishery of Skipjack (Katsuwonus pelamis Linneus) In Tomini Bay, Gorontalo Province. This study aims to analyze environmentally friendly technology and sustainability of skipjack tuna (Katsuwonus pelamis Linneus). This research was carried out from March 2021 to September 2021 in the waters of the Gulf. Tomini Gorontalo Province. Data were collected through surveys, interviews and questionnaires. Environmentally friendly aspects were analyzed using the value function of Monintja (2000), and Mallawa et al.,(2006). The results of this study indicate that the fishing gear, tug line, hand line, purse seine, and payang are considered environmentally friendly, respectively.

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INTRODUCTION

Geographically, Gorontalo Province is located at 0019' – 1015 North Latitude and 123o43' – 123o43'E. This province is located in the northern part of Sulawesi Island with the north coast facing directly to the Sulawesi Sea and in the south with Tomini Bay which is deep-sea waters. Overall, Gorontalo Province has an area of 12,215.44 km2.

Gorontalo Province is an archipelagic area with a total coastline of 560 km and a total marine area of 50,500 km2, Gorontalo has a fairly large fishery potential, namely the estimated number of marine fish (pelagic and damersal) of 1,226,090 tons/year (19.15%). of the potential of marine fisheries throughout Indonesia) with a low utilization rate of around 28.22% (Gorontalo Province Fisheries and Marine Service, 2021).

Fishing by local fishermen in Gorontalo Province, especially in Tomini Bay, is dominated by fishermen

with small-scale fishery businesses or small-scale fisheries that are cultivated on a household scale using fishing tools and methods known from hereditary habits. The relatively low level of education of fishermen causes reduced access to technology, production facilities and capital. As a result, fishing range and capacity are relatively small, catches are uncertain due to the influence of seasons and fishermen have difficulty in innovating to develop their businesses. In addition, not all fishing units used by fishermen meet the environmentally friendly criteria so that the sustainability of the use of fishery resources needs to be questioned.

Utilization of fishery resources, especially capture fisheries, has not made a real contribution to development in North Gorontalo Regency, especially because the production of catches is still low which is partly due to the problems mentioned above. One of the efforts that can be done to answer these problems is the management of people's fisheries with the development of appropriate fishing technology. This effort should be operationally aimed at achieving sustainable balanced catches, production that economically provides maximum sustainable profit, and optimal social conditions such as maximizing labor and reducing conflicts between fishermen. In other words, it is necessary to use capture fisheries resources optimally and sustainably.

For this reason, it is necessary to have policies that can increase the contribution of capture fisheries to development, especially improving the welfare of fishing communities. The sea waters of Sulawesi are one of the typical areas that have great marine and fishery potential, the location is very unique and specifically located at the equator, but resource exploration is still inadequate and requires professional and integrated management in order to ensure the sustainability of fisheries development in Gorontalo Province properly so that sustainable use will occur and maintain the sustainability of existing resources.

One of the largest productions in the waters of the Sulawesi Sea is skipjack tuna (Katsiuwonus pelamis) which is one of the marine fishery resources categorized as large pelagic fish, where skipjack catches vary each year from 2009 - 2012 respectively, 226 tons; 1669 tons; 1675 tons, and 1890.70 tons (Department of Fisheries and Marine Affairs of Gorontalo Province, 2012).

In general, skipjack fishing activities in the waters of Tomini Bay, Gorontalo, use ring trawls, payangs, hand lines, and line lines. In skipjack fishing operations, one of the obstacles in hunting skipjack is the lack of information on fishing ground, changing global climate conditions, so that skipjack hunting becomes less effective, wastes time and fuel but the results are less than optimal. Fishing activities will be more efficient and effective if the fishing area and fishing gear used are optimal.

Therefore, it is necessary to conduct research to examine the development of sustainable and environmentally friendly skipjack tuna fishing in the waters of Tomini Bay, Gorontalo Province.

RESEARCH METHODS

This research was carried out from March 2021 to October 2021 at the base of fishing communities that catch fish around the waters of Tomini Bay, Gorontalo Province.

This study uses tools and materials as presented in Tables 1 and 2.

Table.1. Equipment used in research.

No.	Equipment and Specifications	Utility
1.	GPS (Global Positioning System)	Determining the position of the fishing area
2.	Digital camera	Taking research pictures
3.	Ruler	Measuring fish length
4.	Stationery writing	Record research data
5.	Bucket	Taking water samples
6.	Questionnaire	a list of questions
7.	Boat	Transportation
8.	Thermometer, Refractometer, pH Meter, DO Meter	Determining Water Quality Parameters
9.	Fishing Equipment Unit (fishing line, net, trap, etc.)	Means of Sampling

Table 2. Materials used in the study

No.	Equipment and Specifications	Utility
1.	Fish	Measure length, weight, (cm)
2.	Aquades	Cleaning tools
3.	Formalin	Preserving fish
4.	Satellite Image Data (GPS)	Determination of fishing grounds

Based on the objectives to be achieved, this research was carried out using a survey research method approach to the research object (Stakeholders, fishermen, fisheries actors & aquatic biota) in the waters of Tomini Bay, Gorontalo Province. obtained more focused on the core of the problem.

In addition, he also directly participates in fishing operations. The data collected on Environmentally Friendly Aspects, sampling was carried out at a fishing base which is considered representative of the waters of Tomini Bay, Gorontalo Province. Survey of fishing areas is carried out by plot system based on geographical position. Technical data on fishing gear and vessels will be directly measured for each respondent. Fish sampling was carried out once a week at each location. Fish samples were taken from each fishing gear that had been selected as respondents. Each sampling is assigned randomly. The parameter measured is the total length. Assessment of the environmental friendliness of a fishing gear on

principle has been included in the previous assessment. But here the emphasis is on criteria that have a direct effect. The weighting (value) of each fishing gear against the criteria is one (1) to four (4). To facilitate the assessment, each of the main criteria is divided into four (4) sub-criteria which refers to the opinion of Monintja (2000), and Mallawa et al., (2020).

Fishing units are analyzed based on environmental friendliness. The value obtained from each parameter, both calculated data and in the form of a score value, is entered into the value function and the standard value will be obtained. The value function method is suitable to be used in the assessment of various parameters with various values. According to Mangkusubroto and Trisnadi (1985) the value function method is formulated as follows

$$\frac{v(x) \times xo}{x1 \square xo}$$

Where :

$$v(A) = \sum_{i=1}^{n} vi(Xi) \quad \text{.....(1)}$$

V(X) = function value of variable x; X = variable x;

Xo = worst value on criterion x; X1= the best value of criteria X;

V(A) = value function of alternative A;

Vi(Xi) = value function of the alternatives on the i-th criterion; Xi = criteria i-th

This method can be used in the assessment of criteria that have different units by giving a value from the lowest to the highest. In assessing all criteria, exchange rates are used, so that all values have the same standard. The type of fishing gear that gets the highest score can be interpreted as being better than the others, and vice versa. Furthermore, Mallawa., et al (2020), stated that:

Criteria 81 % – 100 % = very environmentally friendly Criteria 61 % – 80 % = environmentally friendly

Criteria 51% - 60% = less environmentally friendly. Criteria < 50% = not environmentally friendly

An assessment of the environmental friendliness of a fishing gear in principle has been included in the previous assessment. But here the emphasis is on criteria that have a direct effect.

The weighting (value) of each fishing gear against the criteria is one (1) to four (4), to facilitate the assessment, each main criterion is divided into four (4) sub-criteria which refers to the opinion of

Monintja (2000), that Fishing gear is said to be environmentally friendly if it meets the following criteria:

1) Has high selectivity
2) Does not destroy habitat
3) Produce high quality fish
4) No harm to fishermen
5) Production does not harm consumers
6) *By-Catch*low
7) Impact on biodiversity
8) Does not harm the protected fish
9) Socially acceptable
10) Percentage of fish size caught
11) Use of Fuel Oil

RESULTS AND DISCUSSION

1.1. Capture Fisheries Identification

The fisherman group profile based on the survey results in the field, it was found that the level of education, business management knowledge and community income was relatively low. The questionnaire results obtained, the average income of the fishing community was Rp. 700,000 - Rp. 1,700,000 per month. They generally live along the coast with very simple housing conditions.

One of the issues behind the fishing community is poverty. And one of the strategic points that causes poverty is the weakness in business management capabilities. This is due to the low level of education, weak mastery of skills and limited access to information, and socio-economics. is an important commodity such as grouper, tuna, skipjack, kuwe, beronang, mackerel, tuna, and other reef fish that can be used as a source of income for fishing communities.

Sociologically, fishing communities have resources that are relatively difficult to control. With production output conditions that are difficult to control, it makes the challenges of fishing community activities more complex. This condition is formed by the open access model of fishery resource utilization and other given environmental factors such as climate. Such nature directs fishing communities into patron-client networks. This choice is seen as subjectively realistic in order to secure their survival.

Kwandang and Gentuma Subdistricts, Gorontalo is around 3,893 people.

The low use of motorized boats (8%) illustrates low efficiency, so it can be interpreted that the management ability of fishing businesses is very weak, so that economic activity is also inefficient. business management technical guidance.

To increase the income of fishing communities, there are several important things that must be considered; (1) technical assistance to improve skills capacity and important business management is carried out in a sustainable manner, (2) capital capitalization through government schemes and partnerships needs to be increased to encourage business capacity, (3) form economic institutions that can become a forum for increasing the socio-economic capacity of the community and his advocacy.

Weak business management is illustrated by the consumerist pattern of fishing communities utilizing capture fisheries resources in North Gorontalo Regency. Some people use their excess income to buy audiovisual electronic goods. Some of them even carry out house renovations. business development. The most important thing from the fishing fishermen empowerment program is to change the culture of the target community to be productive-constructive. Such as building competitive business motivation, forming the character of giving better than asking and building a high willingness to do business.This can be done through socialization and training as well as dissemination of success stories that are carried out on an ongoing basis and involve informal figures.

1.2. Capture Technology

There are several types of fishing gear used by fishermen in North Gorontalo Regency to catch skipjack tuna, including mackerel, kite, sailing and tuna, including handlines, purse-seines, payangs, and fishing rods which are described in paragraphs- the following paragraphs.

In principle, the fishing line used consists of a long line and a fishing line without ballast. This fishing rod generally uses artificial bait / fake bait. The artificial bait can be made from chicken feathers, attractive colored fabrics or plastic materials in miniature to resemble the real thing (eg squid, fish, etc.). The vessels used are of medium scale, with an average length of 7.3m – 12.5 m deep, 0.75 m – 2.75 m wide, 1.35 m – 1.5 m wide, and the average vessel has a tonnage of 5 – 25 GT. The material for this boat is usually meranti wood. The type of machine used is an outboard motor with an average power of 15 PK, and the number of workers is usually only 3-5 people.

In principle, catching fish with a tug line is to attach a fishing rod to the stern of the ship, which is then pulled by the ship during fishing operations in the hope that the bait on the fishing line is grabbed by the fish being caught. eat on the surface. When a mob is seen, the flags are immediately lowered and the ship's speed is reduced. The end of the hand line is attached to the outrigger and a rubber pad is attached to the main line at exactly one meter from the outrigger to which the line is attached. Then the ship passed past the school of fish, until it was eaten by the fish, and slowly the ship was slowed down to pull the rod with the result of the bait.

Purse seine is a tool (gear) used to catch pelagic fish that form schools. The principle of catching fish with a purse seine is to circle the school of fish with a net, so that the net forms a vertical wall, thus preventing the movement of fish in a horizontal direction. After that, the bottom of the net is tapered to prevent the fish from running towards the bottom of the net.

The length of the purse seine depends on the dimensions of the vessel, operating time, and the type of fish to be caught. The purse seine intended for fishing operations during the day is longer than the purse seine intended for fishing operations at night. Likewise for fish species, to catch purse seine tuna, it must be longer because this type of fish is a fast swimmer. Nets that are too short will not be successful in getting the catch and on the other hand the addition of excessive nets will not guarantee an increase in the catch. So, it is necessary to determine the optimum length of the net that can produce the most catches at the same time.

The coastal areas of Kwandang and Gentumana Raya ports are fishing base areas and fishing ports for Lampara/Mini Purse Seine vessels in the Sulawesi Sea with specifications as shown in Figure 3). These activities include: preparationbefore the ship departs, determine fishingground, the method of catching and handling the catch.

The Purse Seine ship, which is based in Kwandan Harbor and TPI Gentuma, is one day fishing. After the preparations have been completed, the ship immediately heads to the fishing area (Sulawesi Sea) that has been previously determined. Cakalang group (schooling) is to see directly with the help of binoculars from the bridge. Reconnaissance of schools of fish is carried out by the Ship Captain/Owner who acts as "Fishing master" and is assisted by other crew members. Some clues that can be used as signs of a school of fish include groups of birds flying above the school of fish, the presence of drifting wood, and adapted to experience.

Payang fishing gear is a modified fishing gear that resembles a small trawl that is operated on the surface of the waters. In terms of construction, the fishing gear is almost similar to the lampara, the difference is that the otter board is not used in its operation. Payang operations are carried out on the surface layer of the waters. Payang has a low level of selectivity, due to the use of a small mesh size, so it can catch small fish, such as anchovies to larger fish, such as tuna and so on. Payang fishing gear in the study area is mostly operated by small vessels (less than 30 GT) with a limited number of trips (generally one-try day fishing).

The classification of fishing areas is often made based on the material as the type of fish to be caught, the type of fishing gear used, the water area where the fishing business is operated and the ocean area where

the fishing business operates:

a) Species of fish: tuna, salmon and so on.

b) Types of fishing gear: trawling fishing ground, long line fishing ground, pole and line fishing ground, surrounding-net fishing ground, and so on.

c) Water areas: fishing areas in the sea or surface, fishing areas close to the coast, coastal fishing areas and fishing areas in inland waters. Marine areas: fishing grounds in the North Pacific, fishing grounds in the South China Sea, fishing grounds in Southeastern China, and so on.

Handline fishing gear (Handline) is usually operated to catch pelagic fish that have high economic value and have many names such as "Pancing Pemesan", "Klewer Fishing Line", "Tunda Cap", "Irid Fishing Line", "Land Line". diluent", "fishing FADs" and many other regional names.

A tug line is a fishing line that is attached to a long line and pulled by a boat or boat (Figure 5). The fishing line is baited with fresh fish or fake bait which, due to the influence of the pull, moves in the water so that it stimulates wild fish to grab it.

FADs are also known as Fish Aggregation Devices (FAD), which are fishing aids that function to lure fish to gather in a catchable area. Materials and components of FADs vary, but briefly each FAD consists of several components as shown in (Figure 8). Generally FADs still use natural materials, so their durability is also very limited. Fishers generally use floats made of bamboo, while ropes the rigging still uses natural materials, usually rattan and the ballast using stones while the attractor is coconut leaves. This type of FAD is usually installed in shallow waters with the aim of collecting small pelagic fish. Deep sea FADs use rigging from synthetic fibers (nylon rope) , with the main objective of collecting scad, tuna, and skipjack tuna.

The main catches for surface water line fishing rods are tuna, skipjack, mackerel, yellowfin tuna, setuhuk, pestle, sunglir (Figure 9), several types of kuwe. stingray, cucut, gulamah, happy, grouper, and others (Subani & Barus, 1989 in Mallawa, 2020). The types of fish that are the target of catching include bonito fish (Scomberomerous sp.), tuna, salmon, skipjack, mackerel, and others through the back or side of the ship that moves not too fast, a number of fishing lines are pulled with eyes. fishing rods that are generally hidden in artificial baits. The fish will hunt and catch these artificial baits, this of course allows them to be caught (Gunarso, 1985).

1.3. Selection of Eco-Friendly Fishing Equipment

The selection of fishing gear in the results of this study with the title Sustainable and Environmentally Friendly Capture Fisheries Development Strategy in Gorontalo Province with one focus of activity in the first year in the waters around the Sulawesi Sea with a fishing base in North Gorontalo Regency can be explained:

(1) Fish Length Distribution

The composition of the size of skipjack caught during the study varied according to the type of fishing gear. The size of skipjack caught shows that the size composition of skipjack caught with Purse Saine and Fishing Rod varies from 23.0 cm to 52.4 cm. The highest number of catches were sizes 47.0 – 49.9 cm (17.90%) and followed by sizes 44.0 – 46.9 cm (16.64%), and 38.0 – 40.9 (16.36 %) cm. The results of this study indicate that the skipjack tuna caught are mature and spawning fish, this is in line with what was found by Sumadhiharga and Hukom, 1987; Uktolseja et al., (1981); Marr in Suhendrata and Merta (1987).

Furthermore, the size of skipjack caught with tuna longline and fishing line shows that the size composition of skipjack caught with longline varies from 27.0 cm to 52.5 cm. The highest number of catches were sizes 35.0 – 37.9 cm (35.66%) and followed by sizes 32.0 – 34.9 cm (13.19%), and 47.0 – 49.9 (12.27 %) cm. The results of this study indicate that skipjack tuna caught with longlines are generally fish that are suitable for catching/adults, this is in line with what was found by Sumadhiharga and Hukom, 1987; Uktolseja et al., (1981); Marr in Suhendrata and Merta (1987).

The size of skipjack caught using Gill Net shows that the size composition of skipjack caught varies from 23.0 cm to 50.2 cm. The largest number of catches were sizes 35.0 – 37.9 cm (33.60%) and followed by

sizes 32.0 – 34.9 cm (16.80%), and 29.0 – 31.9 (14.80 %) cm. The results of this study indicate that skipjack tuna caught with a fishing rod are generally young fish, this is in line with what was found by Sumadhiharga and Hukom, 1987; Uktolseja et al., (1981); Marr in Suhendrata and Merta (1987).

(2) Species Distribution

The composition of fish species caught during the study varied based on the type of fishing gear. Species of fish caught with tug, Gill Net, and mini Purse Seine. shows that the species composition of fish caught with Gill Net is 2 – 5 species; fishing rods 2 – 4 species; Longlines/handlines 2 - 3 species; Payang 3-7 species and Purse Seine 2-4 species. The results of this study indicate that the fish caught varies for each type of fishing gear in order from the most as follows (Payang/Lampara, Gill Net, purse saine, trolling line, and hand line), with this order in line with what was found. by Uktolseja et al., (1981); Marr in Suhendrata and Merta (1987).

(3) Eco-Friendly Analysis

The results of the capture fisheries survey (Cakalang and Tuna) conducted in the waters of the Sulawesi Sea, North Gorontalo Regency and Gorontalo Regency, obtained 4 types of environmentally friendly fishing gear in a row: (1) Fishing Lines; (2) tug line; (3) Payang/Lampara; (4) Purse Seine; and (5) gill nets. All types of fishing gear are spread in North Gorontalo Regency and Gorontalo Regency.

Environmentally friendly aspects are one of the important aspects in sustainable fisheries. This aspect mainly focuses on how fishing gear impacts the habitat. If the habitat changes, most of the fish and invertebrates will disappear (Hardianto, Krishnayanti and Supyani, 1988). Based on the selection of fishing gear used, the weight value of each fishing gear against environmentally friendly criteria can be seen in (Table 3).

Types of fishing gear classified as environmentally friendly in order of priority are; (1) Handline; (2) tug line; ; (3) Purse Seine and (4) Payang/Lampara. This is based on the assessment of the weighted score given by referring to the provisions of the Code of Conduct for Responsible Fisheries recommended by the world body (FAO) in 1995.

Table 3. Analysis of the value function of the environmentally friendly aspects of fishing units

Variable	Catching tool							
	Fishing Rod		Fishing Rod		Purse Seine/Trawler Ring		Payang/Lampara	
X1 V1(X1)	3		2		2		1	
		1		0.5		0.5		0
X2 V2(X2)	4		4		3		3	
		1		1		0		0
X3 V3(X3)	3		3		2		2	
		1		1		0		0
X4 V4(X4)	3		4		3		2	
		0.5		1		0.5		0
X5 V5(X5)	4		4		4		4	
		0		0		0		0
X6 V6(X6)	4		4		3		3	
		1		1		0		0
X7 V7(X7)	4		4		3		3	
		1		1		0		0
X8 V8(X8)	4		4		3		3	
		1		1		0		0
X9 V9(X9)	2		3		3		3	
		0		1		1		1
X10 V10(X10)	3		2		3		2	
		1		0		1		0

X11	1		3		2		3	
V11(X11)		0		1		0.5		1
Amount	35	7.5	37	8.5	31	3	28	2
Average	3.18		3.36		2.82		2.55	
%	87.35		74.35		70.35		61.53	

Information :

X1 = Has high selectivity, with a score of:

X2 = Does not damage habitat, with a score of:

X3 = No harm to the operator, with a score of:

X4 = Produces high quality fish, with a score of:

X5 = Products produced do not harm consumers, with a score of X6 = low by-catch, with a score of:

X7 = No adverse impact on biodiversity, with a score of:

X8 = Not catching protected fish, with a score:

X9 = Socially acceptable.

X10 = Percentage of skipjack size caught, with a score of:

X11 = Use of Fuel Oil (BBM), with a score of:

Purse Seine and Payang fishing gear have low scores on selectivity criteria and by catch, this is because these fishing gear can catch all types of fish in the fishing area of various types and sizes. Hand and Tonda Fishing Rods each have a low value on the criteria for the product produced and the level of safety for fishermen (operators). This is due to the static way of operating the tool by placing a series of fishing rods at the bottom of the waters for 5-10 hours so that the fish caught early will experience a decrease in quality which can have a negative impact on consumers. Likewise, during hauling, if the fishing line is caught on a rock or rock,

Especially for tuna longline fishing gear, in addition to the impact it has on habitat, namely damaging corals due to fishermen using coral as a foothold when installing tools, it also has an impact on the sustainability of fish resources due to the frequent catching of protected fish species. Likewise, the quality of the fish produced is low, because the method of catching this fishing gear is to physically injure the fish, thereby accelerating the decline in fish quality.

Various efforts to preserve fish resources from the threat of extinction have actually been carried out for a long time by various fishing experts around the world, such as the fishing industry in the North Sea which has made various efforts to reduce by-catch waste more than 100 years ago (Purbayanto and Baskoro, 1999). Furthermore, Stewart and Maclennan (1987) in Zainuddin, et al (2013) stated that the emphasis on the development of fishing technology has shifted from aspects related to increasing the efficiency of fishing gear towards resource conservation including energy conservation, due to increasing pressure on resource stocks.

Monintja (2000) states that, Types of fishing gear that are categorized as environmentally friendly are; Pole and line, trawler simbulak/drift gill nets; fishing rod; hand fishing rod; squid fishing rod; basic longline; anchorage; longline cucut and Purse Seine, these eight types of fishing gear can theoretically meet all the specified criteria, namely; high level of selectivity, does not damage habitat, good quality of catch, safe for fishermen, catch does not harm consumers, small by-catch, low impact on species diversity, does not catch protected and socially acceptable fish.

In accordance with the current trend of fishing technology development which emphasizes on environmentally friendly fishing technology (Environment Friendly Fishing Technology) in the hope of utilizing fishery resources in a sustainable manner. Furthermore, according to Arimoto (1999), environmentally friendly fishing technology is a fishing gear that does not have an environmental impact, does not damage the bottom of the waters (benthic disturbance), the possibility of loss of fishing gear is small, and its contribution to pollution is low. The resource and environmental problems that are currently

being faced have become the basis and important reasons for the development of fishing technology in the future with an emphasis on the interests of resource conservation (Purbayanto and Baskoro, 1999).

The results of the analysis of sustainable fishing gear show the percentages for Fishing Lines, Toddlers, Purse Seine, and Payang respectively with the following percentages; 87.35%, 74.35%, 70.35%, and 61.53% are values greater than 60% so that it can be said that all fishing gear referred to in environmentally friendly conditions. This is in accordance with the opinion of Monintja (2000) and Mallawa (2006) that fishing gear is called environmentally friendly if it meets the specified criteria with a total score of more than 60% and if it is <50% then the fishing gear is categorized as not environmentally friendly. Furthermore, Arimoto (1999), environmentally friendly fishing technology is a fishing gear that does not have an environmental impact, does not damage the bottom of the waters (benthic disturbance),

Table 3 shows that line fishing gear, trolling line, Purse Saine and Payang, are superior fishing gear based on the standardization of functions of the criteria used for X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, and X11, this shows that the line fishing line, line line, purse saine and payang, which are operated in the waters of the Sulawesi Sea, catch skipjack and tuna with relatively the same size, using the same fishing line and mesh size. The use of a uniform fishing line number allows only one type of fish to be caught with relatively uniform size, as stated by Baskoro (1987) that the fishing line unit has a high biological aspect value. This is because fishing rods have high selectivity.

*Purse Seine*operated by circling the fishing goal, so that fish resources in the catchable area will be entangled in the body of this fishing gear net. Thus, the composition of the types of fish caught by the Purse Seine is relatively more than that of fishing rods, this is because the Purse Seine is effective in catching fish that move in groups.

*Purse Seine and Payang*when compared to tug and handline fishing rods are superior or more environmentally friendly. According to Sultan (2004) the types of fishing gear that are included in the environmentally friendly category are drift gill nets, line fishing rods, hand fishing rods, squid fishing rods, bottom longlines, pumpkin traps, razor longlines and Purse Seine. In accordance with the current trend of fishing technology development which emphasizes environmentally friendly fishing technology with sustainable expectations.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the research that has been done, the following conclusions can be drawn:

1. Fishing gear that catches a lot of skipjack tuna, Purse Saine, Payang, Tonda line, and Hand fishing line,
2. Environmentally friendly and sustainable fishing gear, hand line, tug line, Purse Saine and Payang are 87.35%, 74.35%, 70.35%, and 61.53%, respectively.

Based on the results of the study, several things can be suggested as follows:

1. Establishment of a skipjack/tuna fishery information system in the waters of Tomini Bay as a guide for fishermen/fishing entrepreneurs;
2. It is necessary to do research on a combination of predictions of potential fishing areas based on satellite data and FADs to further improve the effectiveness and efficiency of skipjack fisheries.

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