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Utilization and Management of Demersal Fisheries in West Sumbawa Regency, West Nusa Tenggara Province

Pemanfaatan dan Pengelolaan Perikanan Demersal di Kabupaten Sumbawa Barat Nusa Tenggara Barat

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ABSTRACT

Kabupaten Sumbawa Barat sea (KSB) is included in WPPNRI 573, including the Sawu Sea area, Indian Ocean waters, western Timor Sea, southern Java waters, and southern West Nusa Tenggara (KKP, 2014). The potential for demersal fish is in second place after pelagic fish with a total production of 103,501 tons from the potential fishery resources of WPPNRI 573 of 929,330 tons. An increase in catches that exceeds the sustainable potential value will reduce the catches of the next cycle and even have the potential for the extinction of fishery resources. So it must be overcome by making arrangements for the fishing effort to match the carrying capacity of the resource. The purpose of this study was to determine the sustainable potential of demersal fisheries and their level of utilization in West Sumbawa Regency. The methods used in the preparation of this study are field surveys and descriptive methods. The data obtained were analyzed statistically and descriptively, estimating fish stocks using the Schaefer Surplus Production Model. The results showed that the relationship between effort and CPUE obtained a linear equation y=8809-4.425x with R=0.024 which means that there is no relationship between fishing gear and catch. The catch is influenced by external factors such as seasonality and oceanographic conditions. The optimum effort value is 19,489.91 trips per year and the maximum sustainable catch is 8,584,332 kg per year. The last year's utilization rate value was 0.01% with an effort level value of 0.01%. The utilization rate is still relatively low, namely less than 100%.

Keywords: Catching, Fishing Gear, Production, Marine, Sustainable

ABSTRAK

Perairan Kabupaten Sumbawa Barat (KSB) termasuk dalam WPPNRI 573 antara lain wilayah laut Sawu, perairan Samudra Hindia, laut Timor bagian barat, perairan selatan Jawa, dan selatan Nusa Tenggara Barat (KKP, 2014). Potensi ikan demersal berada pada peringkat kedua setelah ikan pelagis dengan jumlah produksi 103.501 ton dari potensi sumberdaya perikanan WPPNRI 573 sebesar 929.330 ton. Peningkatan hasil tangkapan yang melebihi nilai potensi lestari akan menurunkan hasil tangkapan siklus berikutnya bahkan berpotensi pada kepunahan sumberdaya perikanan. Sehingga harus diatasi dengan melakukan pengaturan usaha penangkapan agar sesuai dengan daya dukung sumberdaya. Tujuan penelitian ini adalah untuk mengetahui potensi lestari perikanan demersal dan tingkat pemanfaatannya di Kabupaten Sumbawa Barat. Metode yang digunakan dalam penyusunan kajian ini adalah metode survey lapangan dan deskriptif. Data yang didapatkan dianalisa secara statistic dan deskriptif, estimasi stok ikan menggunakan Model Produksi Surplus *Schaefer*. Hasil penelitian menunjukan hubungan antara effort dan CPUE diperoleh persamaan linier y=8809-4,425x dengan R=0,024 yang mempunyai arti tidak ada hubungan antara alat tangkap dan hasil tangkapan. Hasil tangkapan dipengaruhi oleh faktor eksternal seperti musim dan kondisi oseanografi. Niai upaya optimum 19.489,91 trip per tahun dan jumlah tangkapan maksimum lestarinya 8.584.332 kg per tahun. Nilai tingkat pemanfaatan tahun terakhir adalah 0,01% dengan nilai tingkat pengupayaan 0,01%. Tingkat pemanfaatan tergolong masih rendah yaitu kurang dari 100%.

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Kesimpulan penelitian ini adalah potensi dan tingkat pemanfaatan perikanan demersal di Kabupaten Sumbawa Barat masih berada di bawah potensi maksimal lestari dengan nilai potensi lestari 8.584.332 kg per tahun dan tingkat pemanfaatan 0,01%.

Kata Kunci: Penangkapan, Alat Tangkap, Produksi, Laut, Lestari.

INTRODUCTION

West Sumbawa Regency (KSB) is an area that includes fisheries management areas. Based on Permen KP No.18 of 2014 which contains the State Fisheries Management Area of the Republic of Indonesia (WPPNRI), KSB waters are included in WPPNRI 573 covering the waters of the South Indian Ocean of Java, South Nusa Tenggara, Sawu Sea, and West Timor Sea (KKP, 2014). West Sumbawa Regency has the potential for both renewable and non-renewable resources. In terms of renewable natural resources, the potential to be developed in WPPNRI 573 includes the tourism sector, ecosystem protection, development of minapolitan areas, seaweed cultivation, salt ponds, fishing industry, and capture fisheries (Jayawiguna *et al.*, 2014). In this case, renewable nature indicates that these natural resources can reproduce themselves. But this reproduction activity can only occur if the amount of resources such as fish is exploited only part of its amount in nature. Therefore, the utilization of fish must consider its availability in nature, age, and sex ratio (Sutikno & Maryuni, 2006; Sandria *et al.*, 2014).

Specifically for capture fisheries, the type of fish caught from WPPNRI 573 that is successfully landed by fishermen, namely demersal fish, is the second potential type of fish after pelagic fish, amounting to 103,501 tonnes of the estimated total potential fish resources in WPPNRI 573 of 929,330 tonnes. Demersal fish is a type of fish whose habitat is at or near the bottom of the water (Perangin-angin *et al*., 2016). There are several types of demersal fish including delah, Japanese threadfin bream, manyung, ray, jebung, lebam, delah (Lubis et *al.*, 2021). Demersal fish species include ponyfishes, red snapper, white snapper, Japanese threadfin bream, lencam, kuwe, petek, bloso (Dwiaji, 2018). Based on Lubis *et al.* (2021), demersal fish species are Japanese threadfin bream, manyung, ray, lebam, jebung, and fish next door. The main problem in the demersal fish utilization zone is the lack of stakeholder intervention regarding fishing productivity and problems with the condition of fishermen. So that the condition of capture fisheries until now has not been able to be controlled properly.

The sustainable potential of fisheries is closely related to the amount of catch. If there is a decrease in the amount of catch, it can be used as an indicator of the state of the fishery. As the catch increases and exceeds its sustainable potential value, there will be a decrease in a catch in the next cycle. If the utilization of fish resources exceeds the carrying capacity of the ecosystem, it will have an impact on the decline in numbers and even potential extinction (Sajeri *et al.*, 2019). Based on Akoit & Nalle (2018), if there is continuous fishing exploitation beyond the MSY value, it will have an impact on the scarcity of these fish species. The level of sustainability of natural resources will be disrupted if they are over-utilized (Carda, 2022). So that such conditions must be overcome by regulating the fishing business under the carrying capacity of the resource. If not handled properly, fish stocks will decrease which can result in the scarcity of these resources within a certain period. Based on Cahyani *et al.* (2013), states that the basic part of the analysis of fish stock resources is to know fish populations because it is very important in planning fishery resources. The purpose of this study was to determine the sustainable potential of demersal fisheries and the level of utilization in West Sumbawa Regency.

MATERIALS AND METHOD

Location and Time

This research was conducted in West Sumbawa Regency, namely Jereweh, Taliwang, Seteluk, Sekongkang, Brang Rea, Pototano, Brang Ene, and Maluk sub-districts.

Location and Time

The methods used in preparing this study were field surveys and descriptive methods. The data collected in preparing this study are primary data and secondary data. The data used in this study are National Validation (Valnas) time series data from 2019 to 2022, and field survey data including production data, fishing gear, and the number of fishing efforts.

Data Analysis

The data analysis used in the preparation of this study is statistical and descriptive analysis to explain the current condition of the utilization of capture fisheries resources, aquaculture, and processing of fisheries resources. The results of the data obtained were analyzed to obtain an overview of the current condition of fisheries resources and how to further sustainable management efforts to meet the fish needs of West Sumbawa Regency. Fish stock estimation using the Schaefer Surplus Production Model (MPS). Where the minimum data collected: 1) production of fish species; 2) production of fish species per type of fishing gear 3) number and type of fishing gear. The Schaefer model is a linear equation where: C/f= a bf. At the point of maximum effort (F_{max}), the catch will be zero. C= af² - bf =0; if so at that point a=bf; or f=a/b. At Maximum Catch (MSY), the effort level (F_{opt}) is at half the maximum effort level (1/2. a/b=a/2b).

RESULT AND DISCUSSION

Potential

Demersal fish is included in the type of fish with high economics because it has a good meat flavor so it is much favored by consumers. Although classified as a low-growth fish and relatively low points, demersal fish include high economics so it is necessary to be managed and developed properly (Cahyani *et al.*, 2013). Demersal fish are widely caught by fishermen, not only because of their high economic value but also because the fishing area is relatively close to the coast, and easily accessible to fishermen (Arkham *et al.*, 2021). Demersal fish species in the waters of West Sumbawa Regency are Baronang, Biji Nangka, Gulamah, Kakap, Kerong- Kerong, Kuniran, Grouper, Japanese threadfin bream, Lencam, Japuh, Peperek, Bawal, Gorot-gorot, Kuwe, and Yellow Tail. The fishing gear used are bubu, tonda, payang, fixed gill net, hayut gill net, layered gill net, liong bund net, klitik net, and oceanic gillnet. Huliselan *et al.* (2020) stated that if the fishing gear is not controlled it can cause fish resources to be under pressure, therefore the use of the type and amount of fishing gear affects the catch. Likewise, if the fleet is equipped with inappropriate fishing gear, it can cause overfishing and have an impact on the depletion of fish stocks in nature (Kulanujaree *et al.*, 2020). Table 1 shows the production of different demersal fish each year and Figure 1 shows snapper, which is a demersal fish caught in West Sumbawa Regency.

Table 1. Demersal fish production and production value

No.	Year	Production (kg)
1.	2019	1.275.841
2.	2020	2.102.774
3.	2021	1.792.850
4.	2022	915.453

Source: Valnas KSB Data, 2021

Figure 1. White snapper

Demersal fish production is relatively declining, although in 2020 it increased almost twice as much as the previous year, from 2021 even in 2022 it decreased to below the 2019 production level. Noija *et al.*, (2014) explained that demersal fish are favored by consumers but the amount in nature is not much. One type of demersal fish is snapper as shown in Figure 1 which has a nutritional content of 2 kilocalories of energy, 20 g of protein, 0.7 g of fat, 0 g of carbohydrates, 1 mg of calcium, and 200 mg of phosphorus (Sciputra & Masithah, 2021). In addition, demersal fish species include jackfruit seeds, petek, gulamah, nomei, and serinding

(Suprapto, 2014). Therefore, when high utilization is carried out, the number of demersal fish will likely decrease drastically in the next period. Even if stock recovery occurs, the amount of increase is not much. This is supported by Muhsoni (2019), if the utilization rate or capture rate is high in a certain year, the catch will decrease in the following years. Overfishing which will have an impact on reducing fish biomass indicates that there are fewer resources which will have an impact on reducing the growth rate of a fish species, so overutilization is very dangerous for the existence of a fish species (Listiani *et al.*, 2017). If there is excessive utilization of fish, it will greatly affect the abundance of fish in nature (Eme et *al.*, 2022).

CPUE (Catch per Unit Effort)

The results of CPUE calculations for demersal fish obtained values in Table 2.

table 2. cpue calculation results of demersal fish

Year	Effort (trip)	Production (kg)	CPUE (kg/trip)
2019	220	1.275.841	5799,28
2020	220	2.102.774	9558,06
2021	220	1.792.850	8149,32
2022	110	915.453	8322,30

Source: Valnas KSB data, 2021

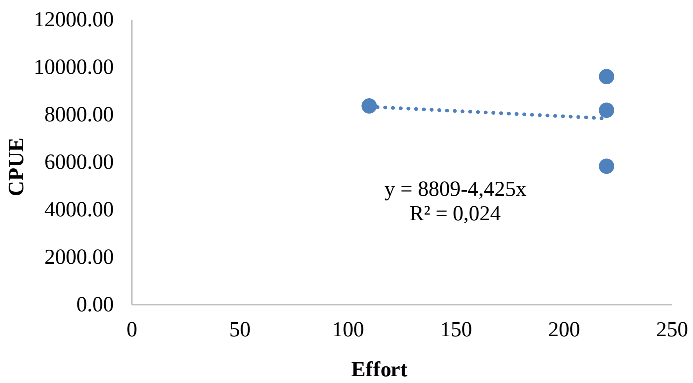

Figure 2. Effort VS CPUE graph of demersal fish

Based on the graph of the relationship between effort and CPUE of large pelagic fish, a linear equation y = 8809-4.425x is obtained with R^2 = 0.024(Figure 2). The equation explains the negative relationship between effort and catch. Other factors that affect production results are other factors such as weather and season. This is in line with Murniati *et al.* (2014); Mayu *et al.* (2018), environmental factors and oceanographic conditions can affect catches and if not supported by good oceanographic or *fishing ground* conditions, it will cause a decrease in catches. The diversity of demersal fish species does not always ensure that the catch will be diverse and in large quantities. But the diversity of demersal fish species will be different in different seasons, so the amount of catch will also vary. Supported by Blolon *et al.*, (2022) states that several factors can affect the catch of fishermen, namely waves, season (both the west season and the east season), and fluctuations in catches can be influenced by the presence of fish, the number of catches, the success rate of catches, and biological factors, namely the ability to grow demersal fish is lower when compared to pelagic fish (Mayu *et al.*, 2018). Weather conditions such as waves, wind direction, wind speed, and also the season greatly affect the catch (Slijkeman & Tamis, 2015). This is supported by Sari *et al.* (2021), weather and season greatly affect the productivity of fish catches. So that each type of fish will have a period of high productivity in certain seasons and will be low in certain seasons as well. At a time of high productivity, the fish may have reproduced so that the population is quite high.

MSY and Utilization Rate

Based on production data, MSY can be calculated using the Schaefer method, the MSY curve of demersal fish can be seen in Table 3.

Table 3. MSY of demersal fish in West Sumbawa Regency

C_{MSY} (kg)	E_{MSY} (Trip)	MSY (kg/trip)	TPc (%)	Tpe (%)
8.584.332	19.489,91	4.404,5	0,01	0,01

Based on calculations with the Schaefer model, the optimum effort value is 19,489.91 trips per year and the maximum sustainable catch value is 8,584,332 kg per year. This amount is still very far from the amount of demersal fish production from year to year in the 2019-2022 period. But if there is a higher or excess utilization of fish in the previous year, there will be a depletion of fish stocks in the following year (Mayu *et al.,* 2018). This is because each type of demersal fish requires a different time to reproduce. To ensure the sustainability of resources, the utilization of fish resources is not allowed to exceed the rate of fish recovery ability (Suman *et al.*, 2016). The KSB community prefers to consume demersal fish compared to pelagic fish, so fishers tend to try to catch demersal fish species. The value of the utilization rate in the last year was 0.01%, with a value of the level of effort of 0.01%. The utilization rate is still very low from 100%. This value is still very low even though the KSB community prefers to consume demersal fish compared to pelagic fish because the demersal fish species that are favored are only a few types from the many types of demersal fish. So to optimize production, it is necessary to increase the utilization of demersal fish (Dwiaji, 2018). This is supported by Irnawati *et al.* (2019), optimisation needs to be done but must be wise so that resources are not damaged.

Policy and Utilization

The catch of demersal fish is still less than the maximum catch value. So that demersal fishing needs to be optimized so that the potential of existing demersal fish can be utilized properly. The policies that can be carried out are by increasing the amount of fishing gear used and optimizing fishing but taking into account its sustainable value and making optimal fishing in certain months or seasons when demersal fish experience an increase in stock while still paying attention to the optimum value of its sustainability. This is because the utilization rate of demersal fish is still very low, which is far from 100%. This means that an increase in fishing activities or fishing efforts can still be done while still paying attention to the sustainability of fish resources (Safruddin *et al.,* 2017). This is in line with Fitriani *et al.* (2016), in maximizing catches; an increase in fishing activities is carried out but is not allowed to exceed the MSY value according to the provisions. So that in evaluating fishing activities and also being the basis for regulating the amount of catch per unit effort (CPUE), the MSY value is used, and the value will be proportional to the biomass stock during the exploitation period (Rais & Wulandari, 2020). The way that can be done in considering its sustainable value is to increase the fishing fleet so that fish resources are well utilized (Irhamsyah *et al.,* 2013). Based on KP No. 71 of 2016, fishing gear that is environmentally friendly and still allowed to be used are longlines and gill nets (Subehi *et al.,* 2017).

CONCLUSION

The potential and utilization rate of demersal fisheries in West Sumbawa Regency are still far below the maximum sustainable potential, with a potential value of large pelagic fish of 8,584,332 kg per year with a utilization rate and fishery level of 0.01% respectively.

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