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ANALYSIS OF THE CAPACITY UTILIZATION OF GLASS EEL IN COASTAL WATERS SUKABUMI, WEST JAVA, INDONESIA

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ABSTRACT

The study aims to measurement capacity utilization (CU) in fisheries with the input and output approach and provide an overview of the policy control of glass eel capture. The methods used in the study are quantitative descriptive methods that are case-study. This research was conducted in August 2019 and January 2020 in Sukabumi, West Java. This research was conducted using a survey method. The data needed in this research are primary and secondary data. Primary data were obtained by the method of interviews and documentation. The average capacity utilization (CU) score during the 2004-2018 period was 0.88. This indicates that during periods the fishery operated at 88% of its optimal capacity. It means that the fishery should produce higher production by the potential production than the current one. Technically, fisheries experience an excess capacity of 12%. Research shows that the policy of a sustainable management regime through the implementation of MEY will generate a government surplus. The government has the task of serving several functions were including providing support policies and legislation.

Keywords: capacity utilization (CU), policy control, glass eel*, sirib* (lift net),

1. INTRODUCTION

One of the capture fisheries industries that are quite developed in Indonesia is the eel fishery. The development of eel capture in Indonesia is partly due to the stipulation of European eels as protected eels. The decision in 2007 by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to include the European eel (Anguilla anguilla) in Appendix II, and the 2010 ban on all exports of eel by EU member states, resulting in a shift in demand for eel species. tropical Asia to meet the demands of the East Asian market (Nijman 2015). Eel Fish are one of the commodities of the fishery that has an important economic value with open market opportunities (especially the purpose of exports) (Lee 2011). The eel resource that needs to be known for its potential is in the coastal waters of Sukabumi especially in the waters of the river estuary, where the glass eels are captured by fishermen (Affandi 2005). According to the IUCN (2018), the condition of eels in Indonesia in several species, including A. bicolor is near threatened and A. marmorata is the least concern (needs special attention). Anguilla bicolor is a species that lives in Indonesia, can be a substitute for the rare Anguilla japonica because it has a similar texture and taste (Noor and Abidin 2019).

The concept of fishery capacity is a measure to determine whether a fishery is an inefficient condition or not with the input and output approach. The general definition of fishery capacity is the maximum stock of capital available in a fishery. That can be fully used at the maximum technical efficiency at certain times and market conditions (Kirkley and Squires 1998). Kirkley and Squires also define capture fishery capacity as the level of effort that allows, maximum potential effort and potential capacity of the fishery (Kirkley and Squires 1999). Meanwhile, according to FAO fishery capacity is the maximum number of fish in a certain time (year, season) that can be produced by a fishing fleet if it is fully used with certain biomass (FAO 1998).

The government set the eel export policy as standard in the bidding system of deals between producers and consumers to create a balance of economic surplus, therefore the theory of economic surplus is very beneficial in analyzing the impact of government interference. Government interference is considered worse if the total loss of economic surplus (loss of consumer surplus and producer surplus) is increasingly the so-called deadweight loss.

Catching glass eel is done in one day fishing. The arrest is repeated with a *sirib* (lift net) until the *koja*/seed container is full of glass eel, the fishermen will climb inland two to three times until the morning (Fig. 1).

Figure 1. Fisherman Glass Eel in Coastal Waters Sukabumi

2. METHODOLOGY

This research was conducted at August 2019 until June 2020 in coastal waters of Sukabumi, West Java, Indonesia. The method used in the study was case-study quantitative descriptive. Case study or case research is research on the status of the subject of research relating to a specific or distinctive phase of the overall personality (IUCN 2018. The study conducted in this study aimed to provide a detailed overview of the status of resources of glass eel catches. The data collected in this study is the primary data and secondary data. Primary data was the data obtained directly from the research object with observations and interviews.The research was conducted in the coastal waters of the Sukabumi. The methods used in the study are quantitative descriptive methods that are case-study. Case studies or case research are research on the status of the subject of research relating to a specific or distinctive phase of the overall personality Noor and Abidin 2019). Approaches to measuring the availability of resources and their extraction that provide benefits and welfare to the community. The calculation of performance efficiency is done using DEA (Data Envelopment Analysis).

The data needed to analyze the output capacity and CU against glass eel catching using lift net. The available data relates to data on trip rates and catch per unit effort from 2004 - 2018, and consists of the following information volume and value of real catches landed.

Performance measurement using DEA is a calculation using linear programming techniques which have two main objectives, namely maximizing output and minimizing input(Cooper et al. 2002). The DEA model used is the CCR (Constant Return to Scale).Model CCR ini yang diambil dari nama penemunya yaitu Charnes, Cooper, dan Rhodes pada tahun 1978, walaupun penemu awalnya adalah Farrel pada 1957 (Tesch 2003).

3. RESULTS AND DISCUSSION

3.1. Production of Glass Eel in Sukabumi

The magnitude of CPUE can be used as an indicator of the level of engineering efficiency of the capture effort, in other words higher CPUE values reflect the efficiency of the use of better capture efforts. The value of CPUE is estimated annually within 15 years. Thus the actual production that exceeds sustainable production in the year of observation is driven by an increase in effort. On average, during the 15 years of observation, actual production of glass eels was still below sustainable production (Table 1).

Year	Input			Actual Production (Kg)
	Effort	CPUE	Real Price (IDR)	
2004	109560	0.1055	99535.5	11556.8
2005	123000	0.098	154111.7	12048.2
2006	137940	0.0804	158111.1	11085.4
2007	152880	0.0857	200000	13094.6
2008	167820	0.0587	192733.9	9849.43
2009	182760	0.0578	220809	10562
2010	131800	0.073	257025.4	9622.76
2011	106320	0.1007	482858.5	10703.5
2012	151720	0.057	1168770	8651.17
2013	144000	0.3777	900090	54387.6
2014	168000	0.0648	1216940	10890.2
2015	162000	0.0235	1907814	3800
2016	96000	0.0729	2210433	7000
2017	156000	0.0707	2666057	11032
2018	94680	0.0255	2624475	2412

Source: : Research (2020)

The catch fluctuates every year. The highest catch in the year 2007 and with the highest price per kilogram glass eel. The performance of catching glass eel which is used as a reference is a target for increasing competitiveness with its efficient performance. In actual technical performance, it is necessary to reduce the use of inputs such as fishing effort (effort) by 25.53 percent and real prices by 48.95 percent from an efficient combination of input and output. The ideal amount of effort is when the efficiency is 100 percent. The range of effort in actual conditions with 100 percent efficiency is below the average effort of 228,581,527 trips (MEY)

Result of harvest glass eel in the estuary of Sukabumi using Sirib as a capture tool dominant special capture glass eel. The development of the catch of glass eel captured around the river estuary is presented in Figure 2.

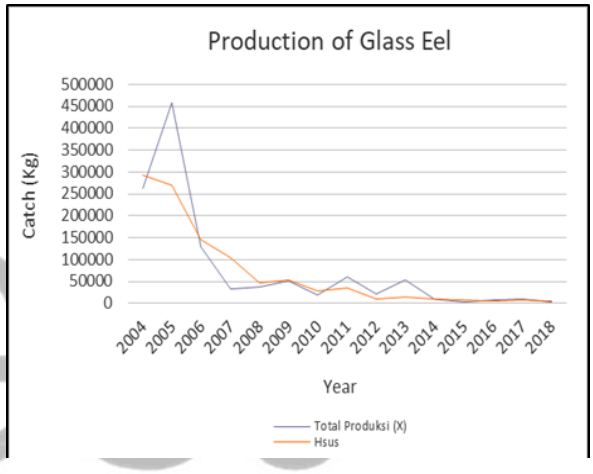

Figure 2. Production of Glass Eel year 2004 – 2018

3. 2. Capacity Utilization Fisheries

Measurement of capacity utilization fisheries. How then can this fishery capacity be measured so that it can be used as a fisheries control instrument? FAO suggests several simple indicators to measure fishery capacity. One of the places to measure fishery capacity is by using the indicator of capacity utilization or often called CU (FAO 1994). Basically there are several methods can be used to measure capacity utilization (CU) from information approaches such as observation of data trends (historical trends) and expert judgment to relatively complex methods such as the Stochastic Production Frontier (SPF). However, no one was there context of fisheries. Especially fisheries in developing countries such as Indonesia which sometimes face data constraints, two commonly used methods are through the Peak to Peak (PTP) and Data Envelopment Analysis (DEA) approaches. Analysis with the DEA approach is considered better and has

been to adjust measure the CU of fisheries. In various regions of the world by using a technique known as Data Envelopment Analysis (DEA). with the DEA method, the diversity of input and output factors in fisheries factors can be measured because DEA allows multiple inputs and output measurements (FAO. 1998). The study aims to measurement capacity utilization (CU) in fisheries to determine whether a fishery is an efficient condition or not with the input and output approach and provide an overview of the policy control of glass eel catches.

Limitation of inputs to the use of fish resources is a problem in fisheries management in general. To achieve the goals of sustainable fisheries development, it is necessary to make efforts related to limiting the inputs used. Input restrictions are closely related to the concept of fishery capacity. Thus the addition of working hours per trip needs to be increased so that the efficiency of the use of fishing gear increases. The expansion in 2013 was due to an increase in effort, while at the end of the observation period it was due to a decrease in effort. (Table 2).

Table 2. Capacity Utility (CU)

DMU	Actual Production	CU	1/CU	Potential Production
2004	11556.8	1	1	11556.75
2005	12048.2	0.95	1.05	12679.63
2006	11085.4	0.86	1.16	12834.75
2007	13094.6	0.95	1.05	13720.25
2008	9849.43	1	1	9849.434
2009	10562	1	1	10562
2010	9622.76	0.86	1.16	11131.01
2011	10703.5	0.72	1.38	14765.44
2012	8651.17	0.82	1.22	10586.36
2013	54387.6	1	1	54387.6
2014	10890.2	1	1	10890.2
2015	3800	1	1	3800
2016	7000	0.65	1.55	10839.27
2017	11032	0.92	1.08	11958.81
2018	2412	0.52	1.93	4648.294
		0.88		

It can be seen that the average CU score during the 2004-2018 period was 0.88 which indicates that during that period the fishery operated at 88% of its optimal capacity. This means that the fishery should be able to produce higher production indicated by the potential production than the current one. Technically, fisheries experience an excess capacity of 12%.

3.3. Excess and Overcapacity

Based on the results of CU calculations on glass eel catching in Sukabumi waters, it shows an excess capacity of 12%. Excess capacity is a condition of excess input that occurs which results in inefficient conditions. Overcapacity is not always caused by modern fishing technology with large and fast boat fleets, but overcapacity can occur in small-scale fisheries. As is the case in Indonesia, the increase in small-scale fishing fleets in coastal waters has created problems related to overcapacity and reduction of excess fishing effort (Berkes at al. 2001).

In other words, excess capacity occurs not because of technology but rather because of the inefficiency of small-scale fisheries operations caused by excess capture fisheries inputs compared to existing resources. Solving the problem of excess capacity is a complex task, so it cannot be solved partially but needs to be done in an integrated and comprehensive manner. The concept of fisheries management based on fishing capacity (capacity utilization and capacity measurement) is one of the breakthroughs to overcome these problems. This concept can provide new policy directions regarding the revitalization and reconstruction of capture fisheries development in the future (Fauzi and Anna 2005).

3.4 The regulation of management instrument

For fisheries sustainability, how much extraction must be taken now and how much is available for the future, as well as how efficient and optimal extraction produces the highest economic value. Instruments that can be applied as an effort to limit fishery output can use the calculation of the allowable catch (JTB) and quotas. The JTB value applied is 80% of MSY. The application of quotas is a development carried out where the application of quotas is adjusted to the proportion of the production contribution of each fishing gear used, while the contribution proportion can be determined using a ratio based on the proportion of catches in

the last year for each fishing gear which will then be multiplied by the value of JTB or MEY (Fauzi and Anna 2005).

The application of quotas is considered capable of eliminating negative externalities that often occur in fisheries. With the quota, the phenomenon of the race for fish can be eliminated because every industry player (fisherman) will certainly get a share to catch fish (Fauzi 2010).

The proposed natural resource management in this glass eel capture fishery is Community-Based Fisheries Management. As we know, fisheries management generally aims to develop fisheries management policies and strategies that can protect fish resources from overexploitation and also protect people's economic livelihood resources. This is as mandated in the FAO code of conduct for responsible fisheries (FAO 1995). which establishes the principles of all countries in the world in terms of proper fisheries management based on sustainable use.

States that in general the best fisheries management is when it can encourage the fishing industry to be able to generate maximum sustainable rents. On the other hand, the property rights-based fisheries management regime has characterized and provided good performance for fisheries in developed countries, even though in most developing countries, the issue of ownership is still a dilemma, with the existence of common property rights. Ownership rights basically provide incentives not to over-capitalize fish resources and thus lead to economic efficiency (Arnason and Kashorte 2001). What can be applied in glass eel catching activities in Sukabumi Coastal Waters is to increase the number of fishing effort (fishing gear units) that are adjusted to MEY conditions (both based on original data and corrected data) to be able to absorb more labor, generating maximum economic rents. , and also can maintain the sustainability of the glass eel resource itself.

One of the management instruments that can reduce the effect of joint ownership rights is community cooperation in fisheries management or known as community-based management, which is one management option that is considered appropriate for developing countries such as Indonesia (Wilson 2001). Community-based management is a system in which authority and responsibility for local resources are shared between the government, local resource users, and their communities (Brown 2003). According to Pomeroy (1995, 1998), these strategies are similar in terms of approach but may differ in the relative user participation of government and resources.

Basically, community-based fisheries management is a responsibility between the government and the community. One of the regulatory efforts is the issuance of the Minister of Maritime Affairs and Fisheries Regulation No. 18 of 2009 which prohibits the export of eel sizes below 100 g and or 2.5 cm in diameter Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia 2009). Indirectly opening up new business opportunities and employment opportunities in the fishery sector through aquaculture systems that have added value in increasing the size of the marketing of eel seeds. Aquaculture is still been practiced at the subsistence level in most countries of the world. Captured fisheries production is stagnating and aquaculture output is expanding faster than any other animal base food sector.

The state of the world fisheries and aquaculture concludes that development in the world fishery and aquaculture during recent years have continued to follow the trends that were already becoming apparent at the end of the 1990s. There are growing concerns with regard to safeguarding the livelihoods of fisheries as well as the sustainability of both commercial catches and the aquatic ecosystems from which they are extracted (Okwodu 2016).

This can be obtained if the regulations carried out by the government can represent the public in terms of limiting permits through payment of capture permits or the determination of catch taxes. Research shows that the policy of a sustainable management regime through the implementation of MEY will generate a government surplus. In this management instrument, the government has the task of serving a number of important functions including providing support policies and legislation. States that community-based management (is the process by which communities have the opportunity and or responsibility to manage resources, define their own needs, goals, and aspirations, and make decisions that affect their socio-economic well-being. Under In this system, the government only plays a small role. The role of the community in the form of fishing groups results in lower management costs (Sajise 1995).

4. CONCLUSIONS

The fishery should be able to produce higher production indicated by the potential production than the current one. Technically,

fisheries experience an excess capacity of 12%.

Limitation of inputs to the use of fish resources is a problem in fisheries management in general. It is necessary to make efforts related to limiting the inputs used to achieve the goals of sustainable fisheries development. The policy of a sustainable management regime through the implementation of MEY will generate a government surplus. In this management instrument, the government has the task of serving several important functions including providing support policies and legislation. and employment opportunities in the fishery sector through aquaculture systems that have added value in increasing the size of the marketing of eel seeds. Aquaculture is still been practiced at the subsistence level in most countries of the world. Captured fisheries production is stagnating and aquaculture output is expanding faster than any other animal-based food sector.

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