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Analysis Of Sustainable Capture Fisheries Management in Tegal City in Legal and Institutional Dimensions

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ABSTRACT

As a Maritime City, Tegal City has a strategic role in developing fisheries and marine potential. One of the superior potentials in Tegal City is capturing fisheries. In addition to the potential for large fish resources, Tegal City also has human resources and infrastructure that are quite good in supporting the capture fisheries sector. However, some of the problems faced by fishermen in Tegal City include the condition of the waters that are densely caught so that fish resources (SDI) are increasingly limited, fishing efforts are increasing, but productivity is decreasing, and there are conflicts over the utilization of SDI which are currently occurring due to regulations that are unclear and ineffective law enforcement. This study aims to analyze the status of sustainable capture fisheries management in Tegal City on legal and institutional dimensions. Data collection was carried out through direct interviews and using a questionnaire. This research method uses the Multi-dimensional Scaling (MDS) approach on legal and institutional dimensions using Rapfish software. The Rapfish Technique (Rapid Appraisal for Fisheries) is a quantitative analysis method for evaluating the sustainability of capture fisheries at research locations with the following attributes those required by the FAO-Code of Conduct for Responsible Fisheries (CCRF) 1995. The results showed the sustainability of capture fisheries management in Tegal City on the socio-cultural dimension of 50.03% (quite sustainable). The leverage factor on the legal and institutional dimensions is the prosecution of illegal fishing with a Root Mean Square (RMS) value of 5.57%, government assistance to institutions of 3.78%, and environmental monitoring of 2.1%. This study concludes that the status of sustainable capture fisheries management in Tegal City in terms of law and institutions is included in the fairly sustainable category.

Keywords: Tegal city, MDS, Raphfish

INTRODUCTION

Nations Convention on the Law of the Sea with a total of 17,500 islands and is located between the Indian Ocean and the Pacific Ocean [1]. This very strategic geographical position means that Indonesia has a wealth of marine natural resources, including fisheries. The fish potential in Indonesia in 2018 reached 1.4 trillion fish and fish production in Indonesia was 6.04 million tons [2].

Tegal City as a city that has a large potential for capture fisheries, with the availability of adequate human resources and infrastructure. Based on 2011 data from the Fisheries and Maritime Service of Central Java Province, Tegal City ranks third in terms of production and value of fishery production in Central Java. The city of Tegal, with a coastline of about 6 km, is capable of producing 35,206.3 tonnes of marine fishery with a production value of 218 billion rupiah. When compared with Tegal Regency, which has a

coastline of 26 km, it is only able to produce marine fishery production of 1269.9 tons with a production value of around 7 billion rupiah [3].

The productivity of capture fisheries in Tegal City tends to fluctuate. Based on capture fisheries production at the Tegalsari Coastal Fisheries Port (PPP) in 2007-2017 it shows that the largest fishery production in 2013 was 50,870,625 kg. The highest average production per unloading was in 2015 with a production of 16,155 kg. Nonetheless, marine fishery production in the City of Tegal has decreased periodically to 30.11% in 2017 with an average production/unloading value of 11,290 kg. Fluctuations in catch results are due to indications of overfishing and the use of various types of fishing gear as well as bad weather [4]. The existence of the covid 19 pandemic has also caused a decrease in the income of fishermen in Tegal City.

Marine fisheries are the dominant agricultural sub-sector in Tegal City. This business is heavily influenced by weather conditions so that production throughout the year will be different. Of the 4 quarters in 2021, the fourth quarter is the period with the highest production of marine fisheries with total production reaching 12,431,563 kg with a value of 101,774,998,000 rupiah [5].

The Tegal City capture fisheries sector is faced with several problems, including the low level of education of fishermen, the high population of fishermen while the fishing area is limited from the coastline so that the fishing locations become congested, capital constraints are also often faced by fishermen, namely the difficulty of requirements and procedures for obtaining loans, besides that not yet optimal utilization of technology supporting fishery business facilities. In terms of regional regulations governing the management of the coastal areas of the City of Tegal have not been drawn up, while the management of the coastal areas has been mandated in the Regional Spatial Plan (RTRW) for the City of Tegal number 4 of 2012. The low awareness of fishing communities in managing fisheries resources is an obstacle in fisheries management sustainable capture [6].

. Sustainable capture fisheries management is currently a major concern for stakeholders with the aim of sustaining fish resources in Tegal City. Sustainable capture fisheries policies are an important matter to study so that fishing communities will experience a positive impact on welfare. This study aims to: 1) Analyze the existing conditions of capture fisheries in the city of Tegal 2) Analyze the sustainability of capture fisheries from legal and institutional aspects

RESEARCH METHODS

Time and location of research

This research was conducted in September-July 2023 on the legal and institutional aspects found in capture fisheries activities in Tegal City, Central Java. The research location is in the coastal fishery area of Tegal City involving stakeholders related to capture fisheries activities as described in the data collection method.

Data Retrieval Method

The survey method was carried out in collecting primary data by conducting interviews and observing the legal and institutional sustainability of capture fisheries activities in Tegal City [7]. Observations on legal and institutional dimensions include 1) Environmental monitoring (2) Government assistance to institutions (3) Influence of local leaders (4) Action against illegal fishing (5) Socialization of fisheries regulations (6) Benefits of fisheries management by groups (7) Institutional development by government (8) Institutional conflict. The respondents in this study used key respondents (key informants) who came from PPP Tegalsari, Muara Reja Port, Marine, Fishery and Animal Husbandry Service of Tegal City, Branch Office of Maritime Affairs and Fisheries Service of Central Java Province,

A literature study was conducted to collect secondary data through searching documents related to the sustainability of capture fisheries management on legal and institutional dimensions in the City of Tegal at the Tegal City Maritime Affairs, Fisheries, Agriculture and Food Service.

Data analysis

The data analysis method used in this study uses the Multidimensional Scaling (MDS) approach using Rapfish software (Rapid Appraisal for Fisheries). All the attributes obtained were then analyzed multidimensionally to determine two reference points, namely good (good) and bad (bad). Sustainability

analysis aims to obtain an overview of the level of sustainability of capture fisheries in the waters of the City of Tegal in terms of law and institutions.

The dimensions used in this study refer to Hidayah et al. (2020) which explains aspects of sustainable capture fisheries management that can be viewed from a legal and institutional perspective. The data that has been collected is then given an assessment score by analyzing the data submitted by the relevant stakeholders. The attributes of each dimension are described in Table 1 below.

Table 1. Sustainability Attributes Legal and institutional dimensions of Capture Fisheries Management in Tegal City Waters

	Legal and Institutional Dimensions		
1	Environmental monitoring	0; 1; 2;	Oversight function: 0 = supervision handed over to the government; 1 = supervision by the community; 2 = government and community collaboration
2	Government assistance to institutions	0; 1; 2	Institutional assistance : 0 = none; 1 = present, irregular; 2 = yes, regular
3	The influence of local figures	0; 1; 2;3	The amount of influence of local figures: 0 = no local figures; 1=no effect; 2 = very influential
4	Illegal fishing action	0; 1;2	Legal action for violation : 0 = none; 1 = yes 2 = often
5	Dissemination of fisheries regulations	0; 1:2	Socialization frequency: 0 = none; 1 = present, irregular; 2 = yes, regular
6	Benefits of group fisheries management	0; 1; 2;	The amount of benefits: 0 = not useful; 1 = quite useful; 2=very useful
7	Institutional development by the government	0; 1; 2	Institutional technical guidance: 0 = none; 1 = present, irregular; 2 = yes, regular
8	Institutional conflict	0; 1; 2	The occurrence of conflicts between fishing community institutions: 0 = none; 1 = sometimes happens; 2 = never happened

Source: Modification [8]

The value of the sustainability status of capture fisheries using the Raphfish method has bad and good intervals from 0-100. To facilitate the division of capture fisheries status categories in Tegal City, the interval is divided into four categories known as ordinate values. The ordinate value of 0-25 indicates poor sustainability status, 26-50 indicates poor sustainability status, 51-75 indicates sufficient sustainability status and 76-100 indicates good sustainability status. Data validation test on Rapfish uses Monte Carlo values. Monte Carlo values are acceptable ifthe difference between the Monte Carlo value and the ordinance value is quite small, which is around 1% [9]

After obtaining the sustainability status values for each dimension, the Root mean square (RMS) value for each dimension is obtained to obtain the attributes that are the leverage factors [10]. The leverage factors obtained are used to determine alternative sustainable capture fisheries policies in the Tegal City Coast.

RESULTS AND DISCUSSION

The sustainability status of capture fisheries management in the coastal area of Tegal City on legal and institutional dimensions is as follows:

The sustainability of the legal and institutional dimensions consists of (8) eight attributes which include (1) Environmental monitoring (2) Government assistance to institutions (3) Influence of local figures (4) Action against illegal fishing (5) Socialization of fisheries regulations (6) Benefits of fisheries management by the group (7) Institutional development by the government (8) Institutional conflict.

The results of the Raphfish analysis for the sustainability of the technological dimension obtained an ordinate value of 50.03% or included in the fairly sustainable category. These results are acceptable considering that the results of the validation test obtained a Monte Carlo value of 49.41%, which means that the difference between the Monte Carlo value and the ordinance value is quite small, namely less than 1%. The results of the goodness of fit test also show that the sustainability index

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estimation model can be used, where a Squared Correlation (R2) value of 0.944 or close to 1 is obtained. This value illustrates that more than 94.4% of the model can be explained properly. The remaining 5.6% is explained by other attributes. Kavanagh (2001) states that the value of the Squared Correlation (R2) is more than 80% indicating that the sustainability index estimation model is accurate and used.

In contrast, the results of the imprecision test analysis (*a lack of fit measure*) obtained a value of 0.1455 or close to zero. The value of inaccuracy/stress which is close to zero indicates that the resulting output is getting closer to the actual situation. In other words, the lower the stress value, the better the model will be. The stress value that can be tolerated is less than 20%, thus the model can be well received with a stress value of 14.55% [11]

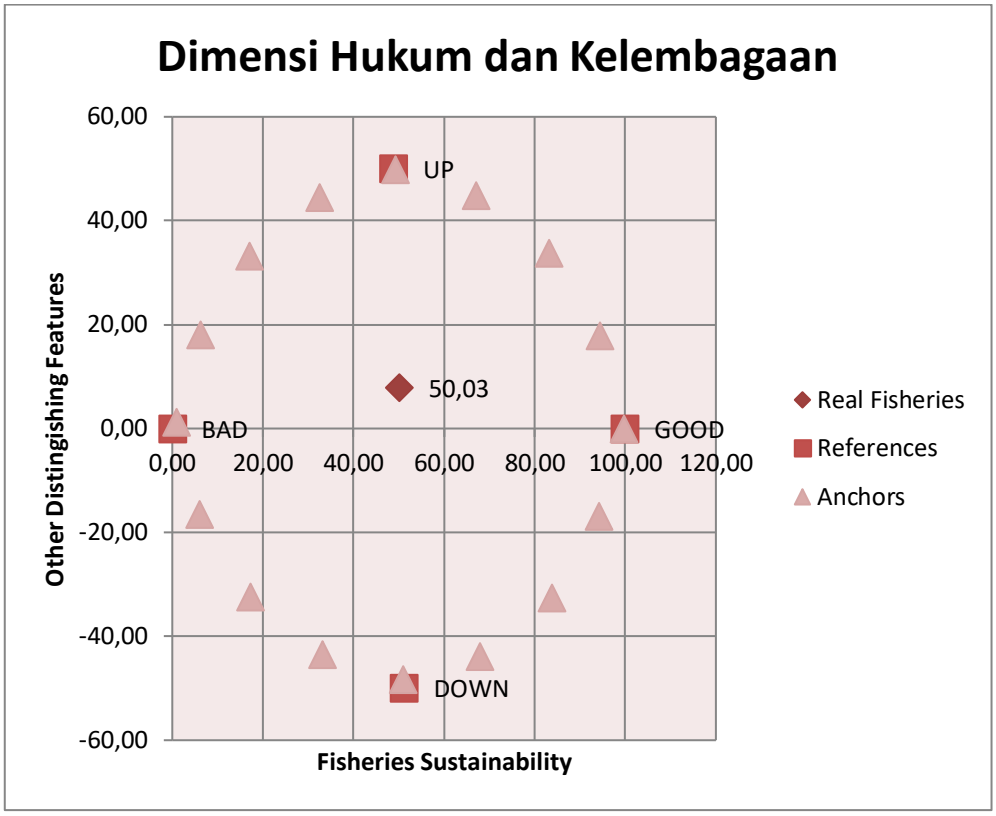

Figure 1. Leveraging attribute of the Institutional Law dimension

Based on the attributes that have been determined above, we get the leveraging attributes of the technological dimension shown in Figure 1 where there are three attributes that influence the sustainability of the legal and institutional dimensions, namely illegal fishing with an RMS value of 5.57%, government assistance to institutions with an RMS value of 3. .78% and environmental monitoring with an RMS value of 3.78%. The RMS value shows the role of each attribute on the sensitivity of the sustainability status [12]. Enforcement of illegal fishing cases is one of the most influential attributes in the management of capture fisheries in Tegal City. This is because there are still fishing vessels that do not comply with regulations regarding environmentally friendly and sustainable fishing.

Illegal capture fisheries are a serious problem in many areas, including in Tegal City or any territorial waters. Illegal capture fisheries can cause a decrease in fish populations, damage to marine ecosystems, and negative impacts on fishermen who operate legally. Several strategies that can be implemented to overcome illegal capture fisheries in Tegal City or other areas include:

1. Increased Monitoring and Law Enforcement: Strengthening supervision by relevant authorities, such as coast guards or fisheries management agencies, to monitor fishing activities in the area and take firm action against illegal fishing actors.

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2. Socialization and Education: Educating the community and fishermen about the negative impacts of illegal fishing, as well as building awareness about the importance of maintaining the sustainability of fish resources and marine ecosystems.
3. Collaboration with Fishermen Communities: Building partnerships with fishing communities to gain support in preventing and reporting illegal fishing, as well as providing alternative sustainable livelihoods for those involved in illegal practices.
4. Utilization of technology: using advanced technology, such as the use of satellite or sensor monitoring systems, to track and detect illegal fishing activity in water areas.
5. Reward and Incentive System: Provide incentives and rewards to fishermen who operate legally and contribute to maintaining the sustainability of fish resources.
6. Area-Based Management: Applying area-based fisheries management by involving fishing communities and local stakeholders to create sustainable fisheries.

It is important to involve all related parties, such as the government, fishermen, scientists and the community, in an effort to overcome illegal capture fisheries in Tegal City or other areas. With the implementation of the right strategy, it is hoped that the problem of illegal capture fisheries can be reduced and fish resources can be maintained in a sustainable manner for the future.

Marine surveillance includes all activities and efforts made to monitor sea waters and sea areas for various purposes, including security, maritime security, law enforcement, environmental protection, and management of marine resources. Marine surveillance involves a variety of parties, including government agencies, international agencies, navies, law enforcement agencies, and various other related entities. The following are some important aspects of ocean surveillance:

1. Maritime Security: Marine surveillance is important to prevent and address security threats, such as piracy, theft, human trafficking and other illegal activities in international waters.
2. Law Enforcement: Marine surveillance is carried out to enforce the laws and regulations that apply to the waters, including marine and environmental regulations, sustainable fisheries, and the prohibition of illegal trade.
3. Marine Resource Management: Monitoring is used to monitor and manage the sustainability of marine resources, such as fisheries, mineral resources, and alternative energy.
4. Protection of the Marine Environment: Through surveillance, efforts are made to monitor seawater quality, biodiversity, as well as the impact of human activities on marine ecosystems and the maritime environment [12]
5. Maritime Rescue and Assistance: Marine surveillance can also be used to detect and provide assistance in emergency situations or accidents at sea.
6. Maritime Traffic Monitoring: Monitors ship traffic and navigation in marine waters to prevent collisions and ensure shipping safety.
7. Monitoring Borders and Maritime Areas: Marine surveillance is used to monitor and maintain the sovereignty of a country's borders and prevent the entry of illegal or unlicensed vessels.
8. Scientific Research and Development: Ocean surveillance also involves scientific research and development to understand and predict changes in the marine environment and maritime phenomena.

Sea surveillance utilizes various advanced technologies such as radar, AIS (Automatic Identification System), satellites, drones and other automatic monitoring systems. International collaboration is also often required in maritime surveillance efforts, especially since many maritime issues involve waters that cross national borders. With effective ocean control, it is hoped that sea areas and waters can be safeguarded, managed and used in a sustainable manner for the common good.

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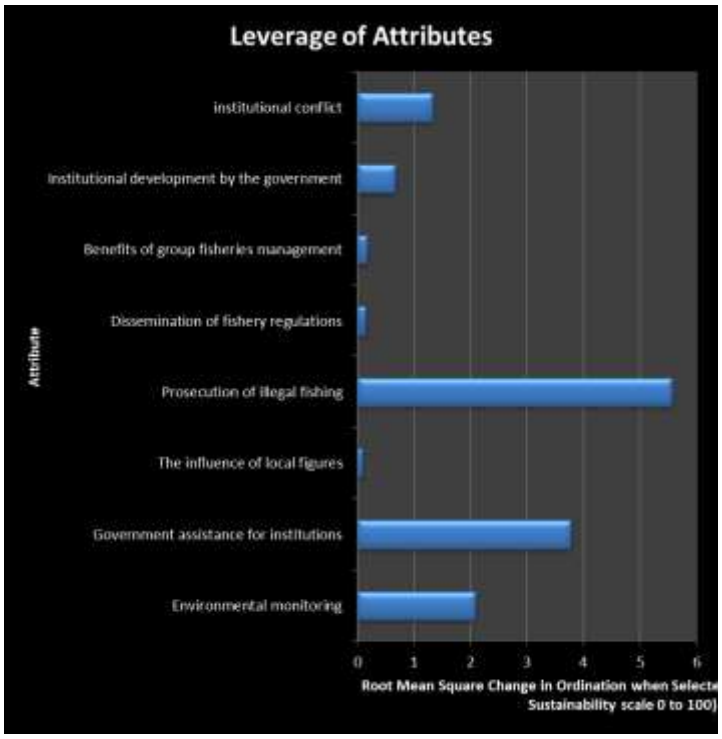

Figure 2. Leveraging attribute of the Institutional Law dimension

CONCLUSION

The results showed that the sustainability of capture fisheries management in Tegal City on the socio-cultural dimension was 50.03% (quite sustainable). The leverage factor on the legal and institutional dimensions is the prosecution of illegal fishing with a Root Mean Square (RMS) value of 5.57%, government assistance to institutions of 3.78% and environmental monitoring of 2.1%. The conclusion of this study is that the status of sustainable capture fisheries management in Tegal City in terms of law and institutions is included in the fairly sustainable category.

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