

SUSTAINABILITY OF SOCIAL, ECONOMIC, AND INSTITUTIONAL ASPECTS ON FISHERIES MANAGEMENT: CASE STUDY AT PALABUHAN RATU NUSANTARA FISHING PORT, WEST JAVA

KEBERLANJUTAN ASPEK SOSIAL, EKONOMI, DAN KELEMBAGAAN PADA PENGELOLAAN PERIKANAN: STUDI KASUS DI PELABUHAN PERIKANAN NUSANTARA PALABUHANRATU, JAWA BARAT

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ABSTRACT

Social, economic, and institutional aspects are crucial for supporting sustainable fisheries management. The objective of this research is to assess the level of sustainability of the social, economic, and institutional aspects of fisheries management, especially at the fishing port level. In this research, field research was conducted using composite analysis and flag modelling visualization in the Ecosystem Approach to Fisheries Management (EAFM) as a tool to assess the sustainability of each aspect. Data were obtained from interviews and questionnaires answered by 90 respondents, including fishermen, port officers, and fisheries entrepreneurs in the Palabuhanratu Nusantara Fishing Port. The results showed that, overall, the sustainability condition in the social aspect was good with a score of 79.69, while the economic aspect was moderate with a score of 55.32, and the institutional aspect was good with a score of 80.28. The lowest levels of sustainability in the social and economic aspects were found in the indicators of stakeholder participation and fishery household income, both in the medium category. In the institutional aspect, the lowest level of sustainability was found in the indicator of compliance with responsible fisheries management principles, which was in the good category. These results are expected to provide stakeholders with the necessary information to take corrective steps to improve sustainability in fisheries management, particularly in the social and economic aspects.

Keywords: economic, fisheries management, institutional, social, sustainability.

ABSTRAK

Aspek sosial, ekonomi, dan kelembagaan sangat penting dalam mendukung pengelolaan perikanan yang berkelanjutan. Penelitian ini bertujuan untuk menilai tingkat keberlanjutan dari aspek sosial, ekonomi, dan kelembagaan pada pengelolaan perikanan khususnya di tingkat pelabuhan perikanan. Penelitian ini dilakukan melalui penelitian lapangan dengan menggunakan analisis komposit dan visualisasi model bendera pada EAFM sebagai alat untuk menilai keberlanjutan pada setiap aspek. Data diperoleh dari wawancara dan kuesioner kepada 90 responden yang terdiri dari nelayan, petugas pelabuhan, dan pengusaha perikanan. Hasil menunjukkan bahwa secara umum kondisi keberlanjutan pada aspek sosial termasuk kategori baik dengan nilai indeks 79,69, aspek ekonomi pada kategori sedang dengan nilai indeks 55,32, dan aspek kelembagaan pada kategori baik dengan nilai indeks 80,28. Partisipasi pemangku kepentingan dan pendapatan rumah tangga perikanan merupakan indikator dengan nilai terendah pada aspek sosial dan ekonomi dengan kategori sedang. Pada aspek kelembagaan, indikator kepatuhan terhadap prinsip pengelolaan perikanan yang bertanggungjawab memiliki nilai terendah dengan kategori baik. Hasil ini diharapkan dapat memberikan informasi yang diperlukan kepada pemangku kepentingan untuk mengambil langkah-langkah korektif untuk meningkatkan keberlanjutan dalam pengelolaan perikanan, khususnya dalam aspek sosial dan ekonomi.

Kata kunci: ekonomi, kelembagaan, keberlanjutan, pengelolaan perikanan, sosial.

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INTRODUCTION

Sustainable fisheries play a vital role in the sustainable development of the fisheries and marine sectors. In addition to providing food and nutrition, fisheries are crucial to both developed and developing economies because they provide income and create jobs (Kenny et al., 2018). One way to ensure sustainable development in the fisheries and marine sector is through the application of the Ecosystem Approach to Fisheries Management (EAFM). Although many definitions exist, there is disagreement on the definition and application of the ecological approach to fisheries management (Hutubessy & Mosse, 2015). The EAFM is a holistic approach that considers all species as vital elements within the ecosystem (Hutubessy et al., 2014). The application of an ecosystem approach to fisheries management (EAFM) is regarded as the ideal strategy and best practice for the long-term sustainability of fisheries and the services that the fisheries ecosystem delivers to society (Pomeroy et al., 2013). Aside from the aspects directly related to the environment and ecosystem, social, economic, and institutional aspects are also crucial in EAFM. Social and economic aspects have broad implications as they are related to education and justice (Miswar E et al., 2018), similar to the institutional aspect. These three aspects are crucial in supporting sustainable fisheries management. Therefore, it is necessary to assess the sustainability condition of these aspects to measure the level of sustainability in fisheries management.

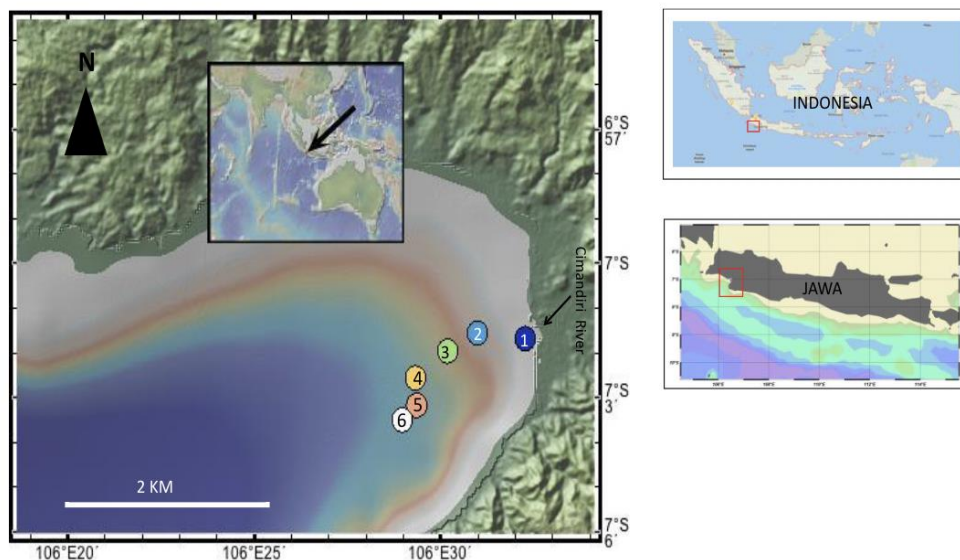
One of the challenges that must be considered is how to implement EAFM appropriately and consistently in the field, adapted to the conditions and characteristics of each region. Rapid success in implementing EAFM has emerged from an extended, constructive, and collaborative approach between managers, stakeholders, and scientists (Muffley et al., 2021; Ramírez-Monsalve et al., 2016). Collaboration is vital for Integrated Ecosystem Assessment (IEA) and the effectiveness of EAFM because it fosters confidence and buy-in from all participants (Muffley et al., 2021). Data in the field shows that there was a drastic decrease in the catch of fish landed at the Palabuhanratu Nusantara Fishing Port (known as PPN Palabuhanratu), especially from 2016 to 2017, and continue to decline until 2020 (Agustian et al., 2021). The decrease in catches automatically results in a decrease in the economic value obtained by the surrounding community. Sea level rise, rising ocean temperatures, severe weather, and ocean acidification are just a few of the many factors that endanger the marine ecosystem and its ability to support economic activity (Sari & Muslimah, 2020). Unsustainability can also occur if utilization exceeds capacity or due to fishing activities that only prioritize one aspect than others (Nandita et al., 2021). Therefore, further assessment is needed of numerous elements of fisheries management using an ecosystem approach, especially in social, economic, and institutional aspects.

RESEARCH METHODS

Time and Location of Study

This research was conducted on November 2019 to January 2020, in the Nusantara Fishing Port (known as PPN) area, Sukabumi District of West Java Province (Figure 1). Data were obtained

from primary data (interviews and questionnaires) and secondary data (annual statistical report, logbook, and other references). Interviews and questionnaires were conducted with 90 respondents consisting of fishermen, port officers, and fisheries entrepreneurs in the Palabuhanratu Nusantara Fishing Port (Table 1). This number represents 1850 population of fishermen, port officers and fish entrepreneurs in that location and is taken based on the Lynch formula, 1974 (Sembiring, 2013).



Source: Akbar et al. (2019)

Figure 1. Research Site

Each group of respondents, especially fishermen and fish sellers, was selected based on certain characteristics. For example, fishermen groups are differentiated based on the size/engine capacity of their vessel, ranging from <5GT to >50GT. Meanwhile, the fish seller group is differentiated based on the number of employees owned, ranging from <5 employees to >20 employees. Further explanation regarding the description of the respondents is explained in the Table 1.

Table 1. Groups and Determination of Respondents

No	Respondents	Total Population (people)	Sample Proportion (people)
1	Fishermen		
	- Vessel < 5 GT	939	44
	- Vessel 5-20 GT	525	25
	- Vessel 20-50 GT	50	3
	- Vessel > 50 GT	215	11
2	Port officers	85	4
3	Fish sellers and other traders		
	- < 5 employees	20	1
	- 5-20 employees	21	1
	- > 20 employees	2	1
	Total	1,858	90

Analysis of Data and Evaluation of Social, Economic, and Institutional Indicators

Data analysis was carried out on each indicator from the social, economic, and institutional aspects. There are 3 indicators in the social aspect, namely utilization of local knowledge, fisheries

conflict, and stakeholders' participation; 3 indicators in the economic aspects namely saving ratio, fishery household income, and asset ownership; and 6 indicators in the institutional aspects those are stakeholder capacity, policy synergy, fishery management plan, decision-making mechanism, completeness of the rules, and obedience to fishery management principles. All of these indicators are the result of adjustments to the conditions of fisheries management in Indonesia (National Working Group on EAFM, 2014). Data were assessed using a basic scoring method based on an ordinal-based Likert scale of 1,2,3; the higher the score, the better (National Working Group on EAFM, 2014). Each indicator has a different density and weight. The density of an indicator shows how much it is related to other indicators in the EAFM, while the weight of an indicator shows the degree of influence in one aspect or domain. The indicator that has the highest weight is considered to have the highest influence and importance on that aspect. Determining the value for each indicator is carried out on the principle that the lower the capacity-building effort or improvement effort, the lower the score for this indicator is (Agustian, 2022). More detailed calculations can follow the formula below.

$$\text{Composite score of each indicator (Nk-i)} = (c_{at i} / c_{at i}^{max}) \times 100\%, \text{ where } c_{at i} = \text{score} \times \text{density} \times \text{weight} \quad (1)$$

$$\text{Composite score of each aspects/domain (Nk)} = \bar{x} Nk_{i-n} \quad (2)$$

Composite index and EAFM score classification

The classification according to Table 2 describes the condition or level of sustainability of each indicator and aspect in the EAFM which is indicated by a composite index score ranging from 1-100 as follows:

Table 2. Classification and Description of EAFM

Composite score	Flag Model	Description
1 – 20		Poor
21 – 40		Low
41 – 60		Moderate
61 – 80		Good
81 - 100		Very Good

The level of description is divided into 5 categories starting from poor to very good with different flag models (National Working Group on EAFM, 2014). Indicators and aspects with a low composite index score are a signal that they can be corrected immediately to maintain and improve their sustainability.

RESULT AND DISCUSSION

Based on the findings of the evaluation of the three existing aspects, 3 categories appear ranging from moderate, good, to very good. Institutional indicators have the highest average (good to very good), while the lowest average is for economic indicators (moderate). More detailed data are presented in Table 3.

Table 3. Scores and Composite Assessment Results for Each Indicator

Aspects/ domain	Indicators	Score	Density	Weight	Composite score	Flag Model
Social	- utilization of local knowledge	2.55	6	25	85.06	
	- fisheries conflict	2.92	8	35	97.32	
	- stakeholders' participation	1.70	4	40	56.70	
Economic	- saving ratio	1.76	1	25	58.62	
	- fishery household income	1.47	9	30	49.00	
	- asset ownership	1.75	2	45	58.33	
Institutional	- stakeholder capacity	2.69	2	9	89.66	
	- policy synergy	2.93	1	11	97.70	
	- fishery management plan	2.00	1	15	66.67	
	- decision-making mechanism	2.61	2	18	86.97	
	- completeness of the rules	2.22	2	22	74.00	
	- obedience to fishery management principles	2.00	9	25	66.67	

Social aspect on Fisheries Management at Palabuhanratu Nusantara Fishing Port, West Java

The social aspect is one of the main parts in the context of sustainable development, including sustainable development in the fisheries sector. In the EAFM concept, the social aspect is one of the 6 aspects or domains that are very concerned to support sustainable fisheries management. This aspect has 3 indicators, namely (1) utilization of local knowledge, (2) fisheries conflict, and (3) stakeholders' participation.

1) Utilization of local knowledge

Utilization of local knowledge in fisheries management can provide important information and perspectives for science in fisheries, as well as determine policies in fisheries management (Raymond-Yakoubian et al., 2017). Based on the results of interviews and questionnaires to fishermen, local knowledge that is still widely used by fishermen in PPN Palabuhanratu is knowledge about reading the weather and fishing seasons as well as astrology and point directions. Natural reference from two local pieces of knowledge are very easy to implement by fishermen when they will or are doing fishing activities (Ariadi et al., 2019). Almost 70% of respondents stated that they had utilized local knowledge and it was effectively used in fishery management activities so a score of 2.55 and a composite index of 85 was in the very good category (Table 3).

2) Fisheries conflict

Conflicts in fisheries management must be minimized and even eliminated because they can disturb the security, comfort, and order of all parties involved in fisheries management. Conflicts can occur between fishermen, between traders, as well as between fishermen and traders, or port officers (Ariadi et al., 2022). However, conflicts that have occurred in the PPN Palabuhanratu are generally related to the struggle for fishing locations and clashes with the fishing gear used. This shows that conflicts between fishermen generally occur due to disputes over the use of fishing gear and traps (Kurniawan et al., 2022; Razak et al., 2020). Most respondents stated that conflicts that occur are very rare (less than 2 times/year), and even then, conflicts are minor and can be resolved quickly such as conflicts over the use of fishing gear and places to anchor ships. Therefore,

according to the Table 3, the score for this indicator is 2.92 and the composite index is 97 with a very good category.

3) Stakeholders' participation

The score for this indicator is 1.70 and the composite index is 57 in the medium category (Table 3). This is because 42% of respondents stated that stakeholder involvement was <50%, 40% of respondents stated that it was between 50-90%, and the rest, or about 18% of respondents stated >90%. The level of stakeholder participation is very important to support the achievement of sustainability of fisheries management because there is a real relationship between the level of stakeholder participation and the success of development in an area (Rantung et al., 2015). Stakeholders' participation will help build a sense of ownership and trust in the fishery ecosystem plan process (Levin et al., 2018) and determine the operational success of fishing ports (Suherman et al., 2020). For example, at PPN Palabuhanratu itself, management officers representing the government consist of central, regional and district governments. All of these parties must actively participate according to their capacities and authorities in order to support sustainable fisheries management. Based on the results of interviews, the lack of participation from stakeholders in PPN Palabuhanratu is caused by the lack of socialization and coordination between stakeholders.

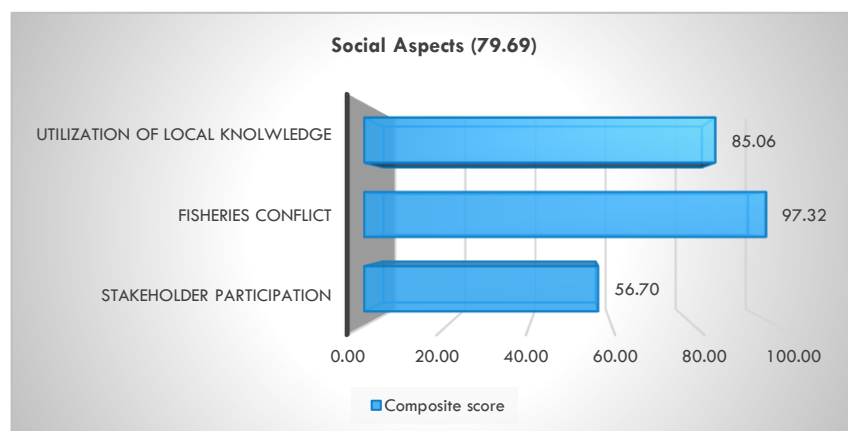


Figure 2. EAFM Description for Each Indicator on the Social Aspect

Overall, based on Figure 2, the assessment for this social aspect is in a good category although the indicator for stakeholder participation is still in the moderate category. This is a sign that the condition of these indicators must be improved (participation from stakeholders) to support sustainable fisheries management. Moreover, this indicator has the highest weight among the three existing indicators, which means that it has the greatest level of influence and importance on social aspects (Ariadi et al., 2022).

Economic aspect on Fisheries Management at Palabuhanratu Nusantara Fishing Port, West Java

In the EAFM concept, the economic aspect is also an important part of supporting sustainable fisheries management. However, in practice, it must still be balanced because prioritizing economic interests has a negative influence on environmental issues (Solihin et al., 2021). There are 3

indicators in economic aspect, namely (1) saving ratio, (2) fishery household income, and (3) asset ownership.

1) Saving ratio

Saving Ratio (SR) is the comparison between the difference between household income and expenditure with their income (National Working Group on EAFM, 2014) The higher the savings ratio of a family, the better the family's financial condition. Based on the results of interviews and questionnaires, 44% of respondents answered that their savings were less than the loan interest rate, 31% the same as the loan interest rate, and 25% more than the loan interest rate. So that obtained a score of 1.76 and a composite index of 58.62 in the medium category (Table 3).

2) Fishery household income

Fishery household income is the amount of income earned by one fishing household, both from the income of the head of the family and other family members (Agustian, 2022). One of the criteria used to compare fishermen's earnings is the government's minimum wage standard (known as UMR). If the income is the same as the minimum wage, it can be said that the fisherman is not classified as poor. The results of interviews and questionnaires showed that 63% of respondents said their income was less than the minimum wage, 28% the same as the minimum wage, and 9% more than the minimum wage. The score for this indicator is 1.47 and the composite index is 49 in the medium category (Table 3). One of the main factors of the respondent's lack of household income is the low selling price of fish due to unfair pricing by middlemen (Retnowati, 2011). Fishermen cannot refuse this because the operational costs of fishing are also obtained from loans to these middlemen, even though there is a difference in the selling price of the fish caught with an average of IDR 2000-IDR5000/kg (Lubis et al., 2012). In addition, the lack of fish preservation facilities and the low proportion of fish processed into more valuable derivative products also contribute to the lack of income for fishermen and traders.

3) Asset ownership

The number of productive assets owned by fishing households now compared to the previous year is referred to as asset ownership (National Working Group on EAFM, 2014). These productive assets are household assets that are used to support fishing activities, fish resource processing, and other economic activities (Agustian, 2022). If the assets increase, the assessment will get better, while if the assets continue to decline, the assessment will also get worse. From the results of interviews and questionnaires, 33% of respondents answered that their assets decreased by >50%, 59% of their assets were fixed, and 8% of their assets increased. So, the score for this indicator is 1.75 and the composite index is 58.33 in the medium category (Table 3). Most of the respondents experienced a decrease in asset ownership because they were forced to sell them to cover debts and meet their daily needs.

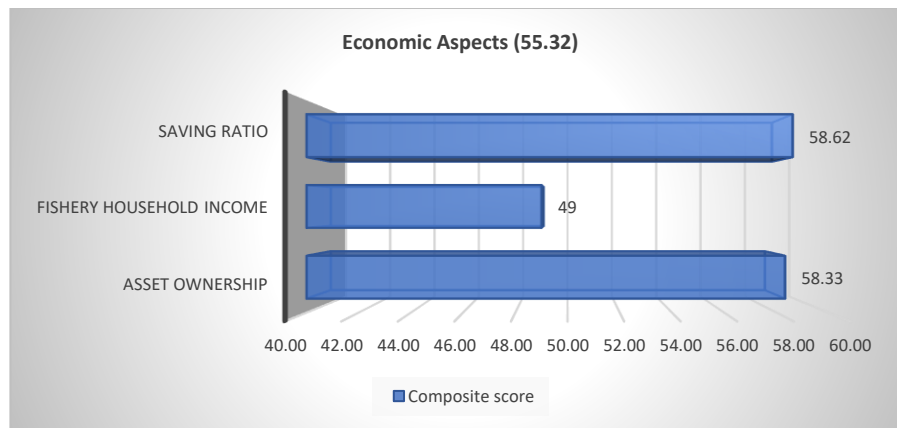


Figure 3. EAFM Description for Each Indicator on the Economic Aspect

All indicators in the economic aspect are in the medium category, with the lowest composite score on the fishery household income indicator, which is 49. This indicator, although not the highest weight, has the highest density among the three indicators in the economic aspect, so it will be closely related to other indicators (Table 3). The indicator with the highest weight is asset ownership, so this indicator has the greatest influence and has a high importance value (Ariadi *et al.*, 2021). Therefore, improvement efforts, especially related to fishery household income and asset ownership indicators, must be one of the priorities to support sustainable fisheries management. Another effort that can be made to increase the economic value of fishery products is through a tradeable right-based management scheme (Sun (Jenny) *et al.*, 2019).

Institutional aspect on Fisheries Management at Palabuhanratu Nusantara Fishing Port, West Java

Assessment and analysis of institutional aspects currently combine more between the organization and the rules of the game (National Working Group on EAFM, 2014). So that the boundaries of this institutional aspect are not only fixed on organizations or institutions that have structures, functions, and management in them but also include aspects of policies and consensus that contain agreed norms and behaviours and become shared values (Agustian, 2022). There are 6 indicators in this institutional aspect as listed in Table 3.

1) Stakeholder capacity

Stakeholder capacity in this case is defined as efforts made to continuously improve the knowledge, competence, and skills of stakeholders in fisheries management such as seminars, workshops, and training (Agustian, 2022). Based on the results of interviews and questionnaires, the majority, or about 77% of respondents stated that there were efforts to increase capacity and function according to their work, so the score was 2.6 and the composite index was 89.66 in the very good category (Table 3). It is very important to develop this capacity as an effort to anticipate various developments related to changes in the environment, technology, and policies in fisheries management such as understanding related to regulations, skills in using fishing gear, knowledge of weather conditions, and others.

2) Policy synergy

Policy synergy in fisheries management must be built starting from the central, regional, and local governments. The policies issued can be in the form of policies regulating the fishing gear used, limiting the number of vessels and fishing efforts, as well as the conservation and protection of habitats. From the results of questionnaires and interviews, 93% of respondents stated that the existing policies support each other so the score is 2.93 and the composite index is 97.70 in the very good category (Table 3). In this context, policy synergy is needed to ensure productive cooperative relations and harmonious partnerships among various stakeholders (Satibi et al., 2023).

3) Fishery management plan

The measurement of this indicator aims to determine the level of effectiveness of fisheries management (National Working Group on EAFM, 2014). Fishery management that is not based on correct and responsible fisheries management principles will only cause damage and loss in the future, both in environmental, social, and economic aspects (Agustian, 2022). The availability of good fishery management plan documents as well as their implementation shows that stakeholders, especially fisheries management authorities who represent the government, have made efforts to continue to develop fishery management activities. The results of research in the field indicate that there is already a fishery management plan document, but there are still obstacles to implementing it. For example, the plan to develop a fishing port has been planned for a long time but is hampered by technical problems in the field such as the difficulty of land acquisition due to rampant brokering practices and the lack of support from local and regional governments. Therefore, the score for this indicator is 2 and the composite index is 66.67 with a good category.

4) Decision-making mechanism

The assessment of the indicators of the decision-making mechanism includes two important things, namely the presence or absence of a decision-making mechanism and the effectiveness of the decision after it has been given or implemented (National Working Group on EAFM, 2014). The effectiveness of the decisions made and implemented can also be seen from the seriousness of the implementation of these decisions, whether they are fully implemented or half-implemented. The result is that 68% of respondents stated that there is a decision-making mechanism, and it is fully effective, while the remaining 32% said that there is a mechanism, but it is not effectively implemented. So, the score is 2.61 and the composite index is 86.97 with a very good category.

5) Completeness of the rules

Two indicators are assessed to determine the condition of the completeness of the rules of the game in PPN Palabuhanratu, namely the availability of regulations in fisheries management and enforcement of the rules of the game in fisheries management (Agustian, 2022). As a result, 57% of respondents stated that the rules were complete and there was law enforcement, 34% said the rules were complete but there was no law enforcement, and 9% said the rules were incomplete and there was no law enforcement. The score for this indicator is 2.22 and the composite index is 74 with a good category.

6) Obedience to fishery management principles

The purpose of this indicator assessment is to find out the frequency of violations of the rules of the game in fisheries management (National Working Group on EAFM, 2014). The measure of success is how big the level of compliance of fisheries stakeholders with applicable regulations and rules of the game is. The results of interviews with fisheries supervisors stated that the level of violations of the rules ranged from 2-3 times per year, so the score was 2 and the composite index was 66.67 with a good category.

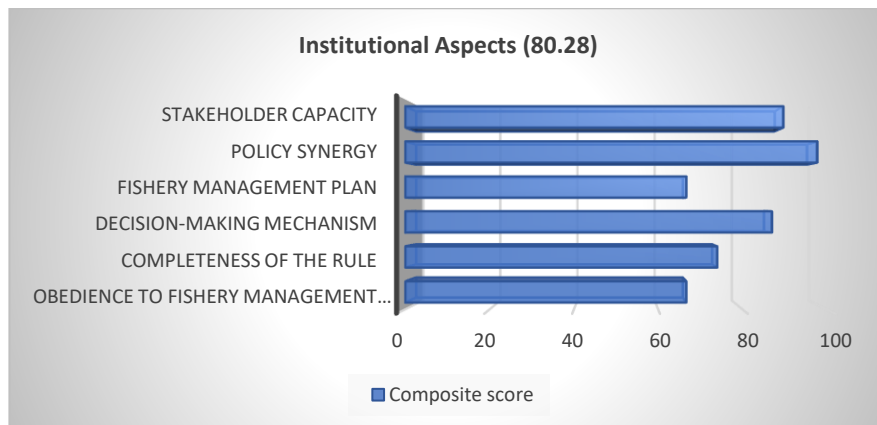


Figure 4. EAFM Description for Each Indicator on the Institutional Aspect

We can see that the categories for all indicators in this institutional aspect are good and very good. This means that the overall performance has been good in supporting and implementing sustainable fisheries management. Even so, there are 2 indicators that relatively still need to be improved, namely the fisheries management plan and compliance with the principles of responsible fisheries management. Especially for the indicator of compliance with the principle of responsible fisheries, its improvement is a priority because it has the highest relevance and level of importance out of the six indicators. Based on the three aspects that have been studied, we can see that the economic aspect is the weakest and is a priority for improvement to improve sustainable fisheries management.

Table 4. Score and Description of EAFM on Social, Economic, and Institutional Aspects

Aspects/ Domain	Composite score	Flag model	Description
Social	79.69		Good
Economic	55.32		Moderate
Institutional	80.28		Good

However, this does not mean ruling out improvements to aspects that are already in the good category. We cannot separate improvement efforts from each aspect as separate parts, but that influences each other. Therefore, efforts to improve must continue to be carried out on all aspects on an ongoing basis, although in priority, of course, prioritizing the aspect with the lowest composite index.

CONCLUSION AND SUGGESTION

Conclusion

Based on an assessment of the three aspects studied, the sustainability of fisheries management at PPN Palabuhanratu belongs to two categories, good both for social and institutional aspects, and moderate for economic aspects. All indicators on the economic aspect are still relatively low, especially in fishery household income. This is caused by the unfair determination of the selling price of fish, which was controlled by big middlemen, the lack of preservation facilities so that the quality of the fish is quickly damaged, and the lack of proportion of fish processed into various derivative products.

Suggestion

Next, suggestions that can be formulated from the findings and analysis in the previous chapter include: 1) Increasing supervision in determining the price of fish on the market and taking firm action against those who break the rules. 2) Assist fishermen groups and fishery entrepreneurs in providing fresh fish preservation facilities so they last longer. 3) Encouraging an increase in the quantity and quality of processed fish products into various derivative products that are more valuable in the market.

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