

Research Article

Sustainable Development Perspective: Analysis of Capture Fisheries in Muncar District Banyuwangi

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Herman Cahyo Diartho: <https://orcid.org/0000-0003-0029-6609>**Abstract.**

Capture fisheries resources in Muncar Regency have enormous potential to support the lives of the community, especially fishermen. However, in these conditions, the volume of capture fisheries production in Muncar Regency has decreased. This research aims to direct sustainable development efforts in the capture fisheries subsector so that it can improve the welfare of fishermen. This is done by optimizing the use of fishery resources without ignoring economic, ecological (environmental), and social aspects. This research uses descriptive analysis methods. The results of measuring the level of sustainability of capture fisheries resources in Muncar District show that the average value is still low. From each dimension (economic, social, and environmental) several criteria have medium (M) and high (H) scores. This means that each dimension requires alternative recommendations to support sustainable capture fisheries development. It takes synergy from all levels of society to maintain the balance of the marine ecosystem. Increasing awareness of coastal communities is needed to maintain the balance of the capture fisheries resource ecosystem. Apart from that improving the quality of human resources in fishing communities is an important thing that the government can do to support the sustainable development of capture fisheries resources.

Keywords: sustainable development, capture fisheries, Muncar

1. Introduction

Indonesia is an archipelagic country whose territory consists of land and water, Indonesia is known as a maritime and agricultural country, so Indonesia has a wealth of diverse energy and biological resources (Wibowo, 2014). The fisheries sub-sector has an important role, especially in producing animal protein in the context of meeting food and nutrition needs, increasing exports, providing industrial raw materials, expanding employment and business opportunities, and supporting regional development while still paying attention to environmental sustainability and functions (As, 2020). However, looking at Indonesia's development so far is ironic because empirically with great potential, the development of the fisheries sector has received less attention and

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has always been positioned as a periphery. This is because so far the development strategy based on natural resources has prioritized the agricultural and mining sectors. In addition, the emphasis on the development of the fisheries sector so far has been more on resource exploitation, resulting in a decrease in the quality of environmental ecosystems and not paying attention to the economic added value that can be obtained from this sector (Iqbal, 2015).

Based on data from the Ministry of Maritime Affairs and Fisheries, in 2016 the potential for capture fisheries in Indonesia reached 9.9 million tonnes, and this figure will continue to increase in the following year as fewer foreign fishing vessels circulate in Indonesian waters. The current issue that often occurs is the problem of damage to marine ecosystems. This has an impact on the unsustainable use of fisheries resources because it causes damage to ecosystems in the sea (Alamsjah, 2015). Sustainable development in the fisheries sub-sector, especially capture fisheries, is ultimately expected to increase production, expand employment opportunities, and improve the welfare of fishermen, and improve the regional and national economy without neglecting environmental aspects.

In fisheries development, the challenge of sustainably maintaining resources is a quite complex problem (Joshi, 2018). Fisheries resources are indeed classified as recoverable resources, but the question that often arises is how much fish can be harvested without causing negative impacts in the future. Sustainability is a keyword in fisheries development which is expected to improve resource conditions and the welfare of the fishing community itself (Arief, 2015). Fishery resources are natural wealth that is cultivated to provide maximum benefits for humans. However, this benefit aspect has various dimensions, including economic, ecological, and social dimensions. The fish resources complexity makes fisheries development goals increasingly complex (Mariani, et al. 2014). Several studies have been carried out including Hidayat (2013), which shows that programs for development, empowerment and institutional capacity building for fishing communities should be carried out in a participatory, integrated, synergistic and systemic manner involving all maritime midwifery authorities. Related to Ratna (2015) found there are four dimensions of sustainable development including ecological, economic, social and institutional that must be pursued together. But, Dedi et al. (2014) show that the economic aspect has the greatest influence among the other three aspects. The biggest problem is the fish price.

The importance of optimal, sustained and sustainable use of fish resources is an extremely urgent requirement for the prosperity of the community, especially the fishing community who make a living from fishing. It is linked to Goal 14 of the Sustainable

Development Goals regarding the sustainable use of oceans, seas and marine resources for sustainable development, and is a recognition of socio-ecological issues. association of coastal areas and the need for action (Jessica, 2019). Therefore, in this study, it is necessary to analyze sustainable development strategies for exploiting aquatic resources in Muncar district, one of the current development goals in Indonesia, as well as examine economic institutions of the fishing community in Muncar district to support economic development. Fishermen's welfare.

2. Materials and Methods

2.1. Location and Time of Research

This research was conducted in Muncar District, Banyuwangi Regency, East Java Province. The selection of this research location was determined purposively (purposive method). Of the many sub-districts in Banyuwangi Regency, this study chose Muncar Sub-district because this area is one of the largest fisheries centers in East Java and there are many activities related to the fisheries sub-sector in this area, especially capture fisheries. This research was conducted from January to June 2017. This research has the strength of study's design and execution in detail for the operating management of the sustainability of fisheries. Then, this research has weaknesses in the study's design and execution the approach does not cover the technology fishermen use to catch fish or ignoring technological and cultural aspects of fishermen.

2.2. Data Analysis

This study uses descriptive research methods because in its implementation it includes primary data, analysis, and interpretation of data from the results obtained. This study uses primary data and secondary data. Primary data was obtained through interviews with 150 respondents of the population, with parties related to the capture fisheries sub-sector such as traditional fishermen, fish traders, and skippers (sea and land owners) using a list of questions. Secondary data is obtained from various sources such as documents or publications from related agencies. The data is collected by focus group discussion (FGD) and have 131 targeted for the interview realization.

The method of assessing sustainability and formulating recommendations using the Sustainable Product-Service System (PSS method) consisted of 4 stages, namely (1) Identifying the dimensions of system sustainability, (2) Formulating and selecting

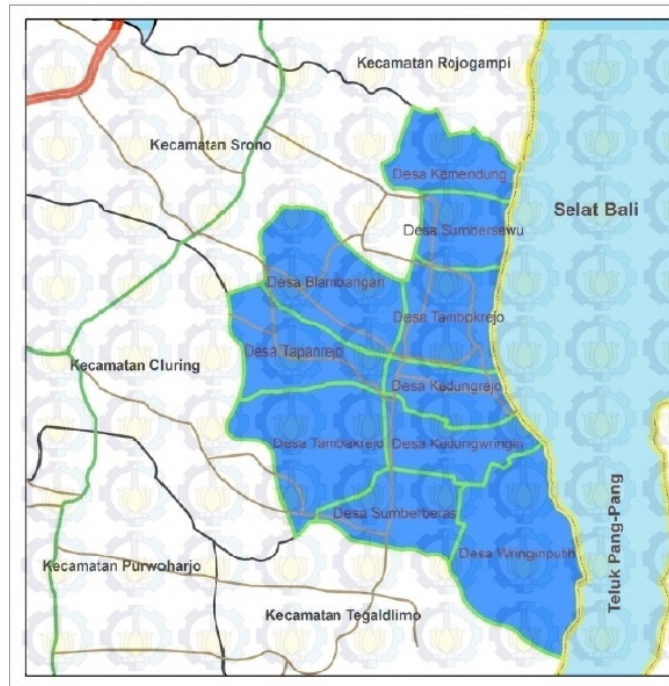


Figure 1: The maps showing the location of Muncar. Source: data processing by RT/RW Banyuwangi.

recommendations of alternative, (3) Conducting for the detailed recommendations in assessment, (4) Evaluating the recommendations to choose what is appropriate.

3. Results

3.1. Fishermen Community Institutions in Muncar

Institutional roles are indispensable in economic development to regulate and control economic actors in the market. In addition, the presence of economic institutions seeks to minimize transaction costs so as to improve economic performance. In fishing communities, existing local institutions have not been able to improve the lives of fishermen. As happened in Muncar District, poverty also occurs in the lives of Muncar fishing communities.

So far, fishermen in Muncar Sub-District have relied heavily on the skippers. They also do not have access to capital from banks, because banks consider credit for MSMEs in the marine and fisheries sector to be high risk. The fish auction place is also not functioning properly. Fish caught by fishermen must pass through several hands to reach consumers.

In a market, there are transaction costs that must be paid by market participants in the form of information, negotiation, monitoring and coordination costs. These transaction costs arise due to the transfer of ownership or ownership rights. According to North (1991) in Fadhiela et al. (2018), these transaction costs arise because there is an imperfect flow of information so that it is necessary to have an institution or institution aimed at minimizing the incidence of transaction costs.

Increasing the institutional capacity of fishermen is needed as a step in improving the level of welfare of fishing communities, especially fishermen in the coastal area of Muncar District so that the dependence and attachment of fishing communities to their skippers can be minimized. The policies made must also be able to touch the needs of the fishing community and not only side with the owners of capital, power holders and employers.

3.2. System Sustainability Dimensions (System Map)

The capture fisheries system map identifies capture fisheries activities in Muncar District as well as material flows in the system, identifies parties directly related to capture fisheries, such as fishermen, fish processing industries, fish traders both on a small and large scale and also fish flour industry (fish waste processing).

3.3. Sustainability SWOT

After making a map of the capture fisheries system in Muncar District, the next step is to conduct a SWOT (strength, weakness, opportunity, weakness) assessment. This SWOT diagram was generated from assessment questionnaires and interviews with fishermen in Muncar District. The questions for sustainability SWOT address 6 criteria from 3 perspectives: economic, environmental and socio-cultural, as well as other considerations considered important. This SWOT diagram will later be useful in identifying recommendations for system improvement (Purwaningsih, et al, 2016). The SWOT diagram in more detail can be seen in Table 1.

3.4. Sustainability Assessment

The final step of the first step before moving on to the recommendation development step is to classify sustainability criteria into No (N), Low (L), Medium (M) or High (H) categories to explore Other recommended criteria as needed. will be performed. The

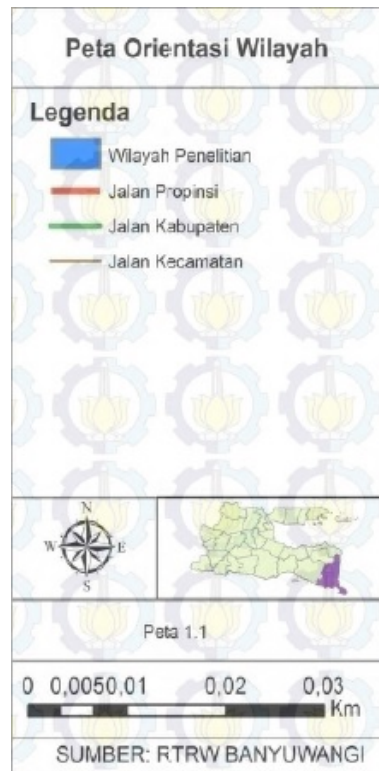


Figure 2: Capture Fisheries System Map. Source: Data processing.

assessment was carried out by distributing questionnaires to respondents, specifically fishermen of Muncar district. Then, data processing is performed based on each respondent's answers using a scoring system. The answer "Yes" gets a score of 1 and the answer "No" gets a score of 0. For the scoring system, the score for each total value of each criterion is 1. For example, in a criterion with 4 questions with 2 "Yes" answers, the value is $\frac{2}{4}$ or 0.5.

The table above shows that the sustainable value of fisheries in Muncar district is still low. The average value of sustainability for each dimension is greater than 0.44. The economic aspect includes a criterion with an average value of High (H), which is the catch yield criterion. Based on the results of field research and additional data from the Maritime and Fisheries Department of Banyuwangi Regency, fish catch in Bali Strait waters continues to decline every year.

Environmentally, environmental sustainability has a low or medium value (L), which shows that the Muncar district fishing community is starting to realize the importance of keeping the coastal environment clean to No pollution, no disturbance to the environment. balance the coastal ecosystem. Unlike the situation a few years ago, the community is still reluctant to participate in keeping the coastal environment clean because the activities only exploit aquatic resources.

TABLE 1: Results of Capture Fisheries Sustainability Assessment in Muncar District.

Criteria	Total value	Average	
Economic Dimension			
1.1 Income	36,25	0.37	M
1.2 Quantity Number of Catches	76.5	0.78	H
1.3 Capital Origin	56.5	0.58	M
1.4 Distribution of the catch	6,25	0.06	L
1.5 Government Assistance	65.5	0.66	M
1.6 Fish Prices	26.75	0.27	L
Average	44.62	0.45	L
Environmental Dimensions			
2.1 Environmental Sustainability	16.5	0.17	L
2.2 Catching tool	45.75	0.47	M
2.3 Fish Waste	68	0.69	M
2.4 Fishing Radius	37,25	0.38	L
2.5 Conservation	45,25	0.46	L
2.6 Biodiversity	60.5	0.62	M
Average	45.54	0.46	L
Social and Cultural Dimensions			
1.1 Partnership Relations	24	0.23	N
1.2 Conflict	37.5	0.38	L
1.3 Education	63,25	0.64	M
1.4 Institutional	61.75	0.63	M
1.5 Occupational Safety (K3)	61	0.62	M
1.6 Rules/Norms	41.5	0.42	L
Average	48,16	0.42	L
Average Value	46,10	0.44	L

Muncar fishermen have also started conservation work on the Kayu Aking waters, which is currently a protected marine area under the Banyuwangi Government's Regional Regulation No. 35 of 2003 on the establishment and management of protected marine waters. guard of Kayu Aking in Muncar district, Banyuwangi. Regent.

Other environmental criteria have average values (M), specifically fish waste and biodiversity. The environmental sustainability situation in Muncar waters is quite worrying, the number of fish species is decreasing and the catch is also decreasing every year,

TABLE 2: SWOT of Capture Fisheries Sustainability in Muncar District.

Criteria	Current Condition of Fisheries		Prediction of Future Conditions	
	Strength	Weakness	Opportunity	Threat
1. Economic Dimension				
1.1 Income			- Assistance from the government in the form of fishing gear that is more environmentally friendly	
1.2 Quantity of Catches	- The potential for fishery resources in the Bali Strait region is abundant if utilized properly	- Fishermen's skills are low in other fields - The number of fish catches is continuously decreasing	- Increasing the number of catches of fishermen	- The quantity of fish caught continues to decline, fishermen do not earn income
1.3 Capital Origin				
1.4 Distribution of the catch				
1.5 Government Assistance				
1.6 Fish Prices				
2. Environmental Dimensions				
2.1 Environmental Sustainability	- Fishermen use environmentally friendly fishing gear	- Fish waste is dumped around Muncar waters	- Maintaining environmental sustainability will increase the potential of capture fisheries	- Waste will pollute the environment and water areas
2.2 Catching tool	- Fishermen do not catch fish in conservation areas	- Limited use of fishing gear		
2.3 Fish Waste				
2.4 Fishing Radius				
2.5 Conservation				
2.6 Biodiversity				
3. Social and Cultural Dimensions				
3.1 Partnership Relations	- Good understanding of coastal management by some communities	- Fishermen's safety is threatened because they do not use safety equipment that does not meet standards	- With good education, fishermen will be able to understand sustainable management of marine resources	- Exploitation of marine resources
3.2 Conflict				
3.3 Education				
3.4 Institutional				
3.5 Occupational Safety (K3)	- There is minimal conflict			
3.6 Rules/Norms				

especially last year. The treatment of industrial fish waste also needs recommendations or improvements due to the impact it causes.

The social aspect shows that the possibility of conflict between fishermen in Muncar district is low (L), which indicates that there is no conflict between fishermen or between fishermen and bosses. Fishermen have a good partnership with the captain as a capital provider. Without the intervention of the captain, fishermen, especially working fishermen, cannot fish at sea due to limited capital.

3.5. Discussion

Based on the results that have been obtained regarding fisheries system maps, SWOT diagrams to sustainability assessments, several alternative recommendations have been formulated for each dimension. The formulation of recommendations is based on the

results of the sustainability assessment, where only those with dominant Medium (M) and High (H) values will be given a choice of recommendations. The development of recommendations between each aspect is interdependent, essentially consisting of achieving sustainable management of fishery resources based on sustainability aspects (Charles et al, 2022).

From an economic perspective, alternative recommendations are chosen to increase fish numbers because this is the most dominant attribute. The number of fish caught in Muncar district is decreasing every year not only due to natural factors but also human factors (Ratna, 2015). Marine conservation activities are a means to restore the status quo of the Bali Strait waters. Improved fishing systems as well as the use of more environmentally friendly fishing gear are also necessary to maintain the sustainability of fishery resources.

From an environmental perspective, alternative recommendations are more oriented towards waste management. Waste pollutes sea water quality and prevents fish and other marine life from living normally. Completing the Industrial Wastewater Treatment Plan (STEP) channels according to standards and operating them properly can reduce waste pollution occurring in Bali Strait waters.

From a social and cultural point of view, the project aims to improve the educational level of the fishing community in the Muncar district. This is also related to Atikah (2013) that education has implications for their knowledge on how to manage fishery resources sustainably and sustainably to manage not just exploitation but also pay attention to environmental sustainability. Ultimately, sustainable development of fisheries resources aims to enhance the well-being of fishermen and coastal communities. In addition, institutional improvements in fishing management are also an important point to note. The existence of an organization that provides a forum for the fishing community is expected to help the fishing community become self-reliant and improve their welfare. From the above explanation, several key points can be drawn. Regarding the economic aspect, two recommendations were made: conservation of the waters of the Bali Strait and the role of the government in providing support in the form of fishing gear. Regarding the environmental aspect, an important recommendation was made, namely the creation of a wastewater treatment plant using standards. Regarding cultural and social aspects, there are two recommendations made: improving the educational level of the fishing community, especially the children of fishermen, and perfecting the institutions of fishermen. This can be one of the long-term strategies to improve fisheries activities (Mustaruddin, 2012).

After making alternative recommendation, the next step is to compare these alternatives with current conditions. Would the alternative recommendations presented preserve the Muncar District fishery in categories that could be much better, better, okay, similar, or even worse than current conditions? ? The comparison of these recommendations was carried out by interviewing fishermen who know the importance of sustainability in fisheries development. The results of the comparison of alternative recommendations can be seen in the table 3.

TABLE 3: Comparison of Recommendation Formulation Alternatives.

Dimensions	Criteria	Mark
Economy	a. Conservation of the waters of the Bali Strait	++
Environment	a. Government role	+
	b. Making WWTP	++
Social and Culture	a. Education improvement	+
	b. Institutional improvements	++

Description: “++” Much better, “+” Better

From the table above it can be seen that all of the alternative formulations of recommendations for both economic, environmental and social dimensions can have a much better impact on the sustainable development of the capture fisheries sector so that all of these alternatives can be implemented. In line with Lukman (2012) integration between environmental, economic and social in favor of fishermen is needed to be implemented.

3.6. Sustainability Radar

Creating a sustainability radar is the final stage of the entire PSS method. The results of the comparison of recommendations that have been made in the previous stage are then visualized in the form of a radar (Carlo, 2018). Criteria that have a value of “++” or in the sense that if the existing recommendations are implemented will make the system better, described with the sharpest radar out. Making this sustainability radar uses the Sustainable Design Orienting Toolkit (SDO Toolkit) software.

The figure above shows that the criteria for having a medium type (M) are the income level of fishermen, government support and capital origin. There is one criterion with a high rating (H), which is the number of caught products. This shows that these criteria play an important role in the development of fishing resources. This criterion also has the sharpest form of the radar tip when it has a value of “++”, meaning that the alternative recommendations given would be much better if implemented. As for the government

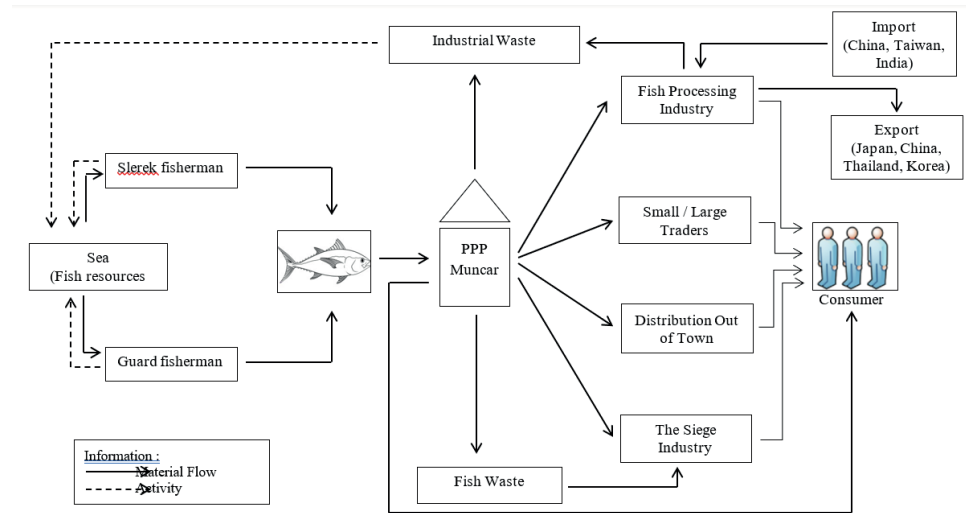


Figure 3: Economic Dimension Sustainability Radar. Source: Data processing.

aid criterion, it has a value of “+”, meaning that if the recommendations are made, the current system will be better than before.

In Figure 4, the sustainable development radar for the environmental aspect shows that the fish waste criteria have the sharpest radar tip because compared to the current system, these criteria have a value of “++”, meaning If the existing recommendations were implemented, the current system would be much better than before.

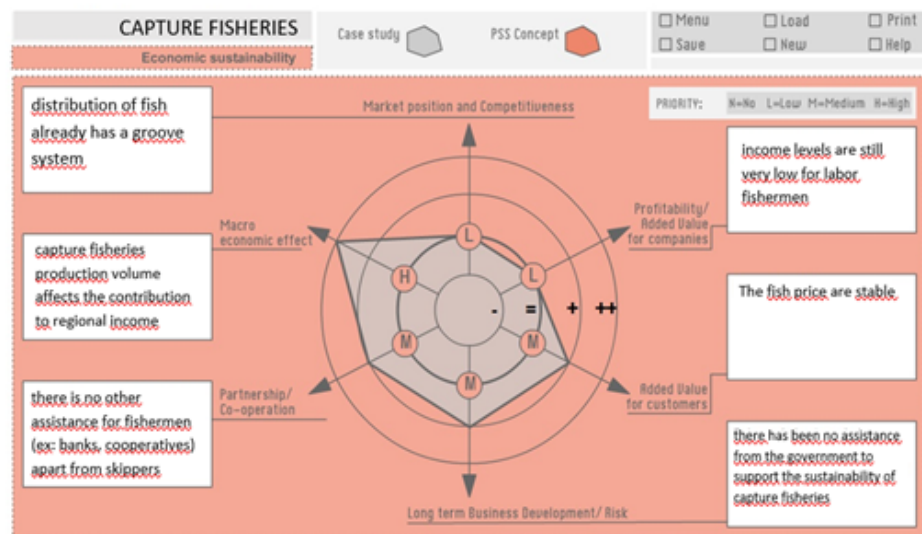


Figure 4: Environmental Sustainability Dimension Radar. Source: Data processing.

This criterion has an average value (M). Another criterion with a medium value (M) is biodiversity as well as fishing gear. Biodiversity in the waters of the Bali Strait is increasingly rare, with some types of fish no longer found in the waters of the Bali Strait.

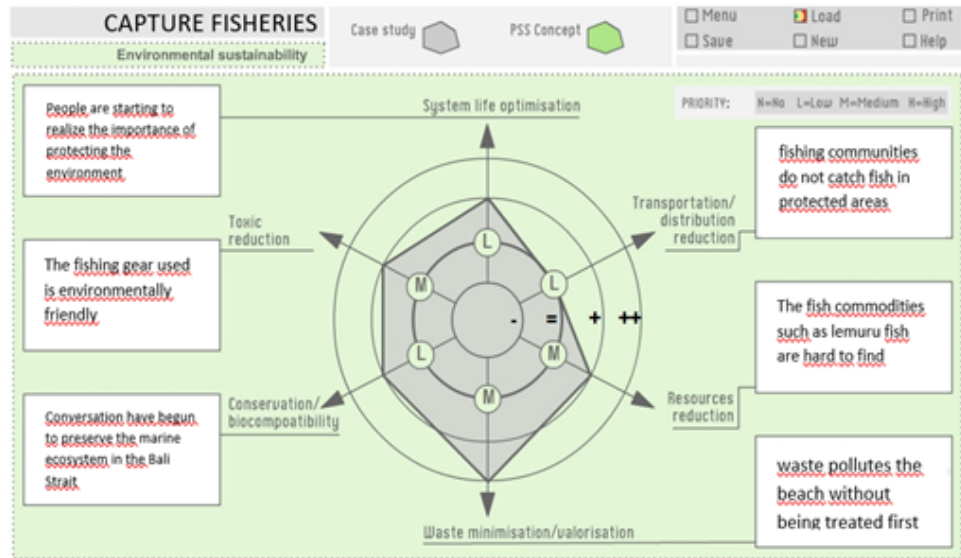


Figure 5: Social Dimension Sustainability Radar. Source: Data processing.

In Figure 5, specifically the sustainable development radar for the social dimension, we can see that the criterion that represents the sharpest end of the radar is institutions. Indeed, compared to the current system, implementing the institutional recommendations would make it much better than the current system. This criterion has a mean value (M) and therefore requires alternative recommendations. Then another criterion is that education has a “+” value so if these recommendations are implemented it will also make the system better than before.

4. Conclusion

The development of aquatic resource exploitation or capture fisheries resources in Muncar district has not yet reached a sustainable stage. This is reflected in the calculation of sustainability ratings using the PSS spreadsheet. The results of measuring the level of development of fishing resources in Muncar district show that the average value is still low. For each aspect (economic, social and environmental), there are several criteria with medium (M) and high (H) scores. From an economic standpoint, reducing catch numbers is the top priority in making recommendations. Those who benefit from fishery resources must demonstrate their interest in the form of conservation action that sustains fishery ecosystems. From an environmental perspective, there is only one recommended development priority, which is to produce WWTP and use it according to standards. Better waste management can reduce pollution so as not to affect the

balance of aquatic resource ecosystems. At the societal level, improving the institutional system is a selection of recommendations that can improve the fishery resource management system in the Muncar district to support the improvement of the well-being of the fishing community. Ultimately, improvements in all aspects of supporting sustainable development of fisheries can maintain the sustainability of fishery resources so that optimal use of fishery resources can be made. from an economic, environmental or social point of view.

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