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Analysis of Vulnerability and Resilience of Fisherman Households in Facing the Covid-19 Pandemic in Jayapura-Papua City

Halomoan Hutajulu[1]

[1] Halomoan Hutajulu, Department of Economics, Faculty of Economics and Business, Cendrawasih University, Papua, Indonesia.

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Corresponding Author:
Halomoan Hutajulu
halomoan.h@gmail.com

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Abstract: Fisheries resources in Jayapura City is very potential. Fisherman households are very dependent to use fishery resources. Pandemic Covid-19 has an impact of fishermen's households economy. The research was conducted on 62 KK in Jayapura City, namely in Hamadi and Dok 9. The research objective was to determine the level of vulnerability and resilience of fishermen households due to the Covid-19 pandemic. The data used consists of primary data and secondary data. The results of the study show that the most impactful aspects of the Covid-19 pandemic on respondent fishermen are the economic aspects and the level of resilience of respondent fishermen is classified as moderate with a resilience value of 4,90, this shows that the social resilience of respondent fishermen is moderate in facing the Covid-19 pandemic. Because the potential of the resource is potential, so that what the related institutions need to do is to prepare facilities that can support the production process after capture fisheries activities.

Keywords: Covid-19 pandemic; Fisherman's household; Resilience; Vulnerability

Introduction

Jayapura City has a wealth of coastal and marine resources. One of the resources found in coastal and marine areas is the wealth of fishery resources. Data on the number of sea fishermen in Papua in 2022 reached 69,955 people and inland public waters fishermen (PUD) reached 24,267 people with a total number of fishermen reaching 94,222 people, while the number of fishermen from Jayapura City reached 1,239 people and the number of fish caught fishermen reached 43,500 thousand tons (Hutajulu et al., 2018). One type of fish that has superior production and has an impact on fishermen's income is skipjack tuna (Soekartawi, 1995; Umar, 2003; Hutajulu et al., 2019). The emergence of the Covid-19 virus, hit China in December, the plague has spread massively throughout the world. Since the virus arrived in Indonesia until now, data on the number of sufferers has reached 225,030 infected people, 8,965 people have died and 161,065 people have recovered. Handling steps have been taken by the central government to handle it, but because drugs and vaccines have not yet been found for its treatment, around March 2020 the virus arrived in Jayapura City.

The impact of the existence of the Covid-19 virus has disrupted economic activity due to the existence of a lockdown system or large-scale social restrictions (PSBB) that has been carried out in Jayapura City. These restriction activities include: stopping air transport/aircraft and ships carrying passengers to Jayapura City, in addition to curfew restrictions between 20.00-06.00 and business operations/shops/malls and markets until 2pm for traditional markets, while markets modern until 18.00 Eastern Indonesia Time (WIT).

As a result of these restrictions, it has had a very significant impact on production and marketing activities in all economic sectors, including marine fishing activities in Jayapura City. Fishery/fisher households (RTP) in Jayapura City as a group of people

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affected by the Covid-19 pandemic, therefore an in-depth study is needed to determine the level of vulnerability and resilience of fishing households in dealing with the Covid-19 pandemic in Jayapura City.

Method

The research was carried out in Jayapura City in May-July 2021. The data used consists of primary data including: amount caught, price and marketing of fish, level of vulnerability, level of resilience, survival strategy. While secondary data includes: the characteristics of fishermen, the number of fishing households, the amount of marine fisheries production in Jayapura City. The research population was fishing fishermen households in Hamadi and Dok 9 Sub-Districts totaling 1,239 households spread across Hamadi and Dok 9 Sub-Districts. The method of determining the sample used in this study was by using a purposive sampling method (samples with certain characteristics) using a percentage 5% of the total population of yellowfin tuna fishing households totaling 1,239 families, which is 62 families.

The analytical method used is the analysis of the level of vulnerability and resilience of fishermen in Jayapura City (Rejeki et al., 2016; Salim & Darmawaty, 2016). This livelihood vulnerability analysis was carried out by constructing a Coastal Communities Livelihoods Vulnerability Index Matrix, taking into account: Exposure is regarding the nature and degree to which the community system is affected by the changes that have occurred; Sensitivity is regarding the degree to which the community system is affected by change and shock; and Adaptive is regarding capacity, namely the ability of the community to accept change and anticipate it by preparing adaptation and/or mitigation strategies.

Indicators of community socio-economic vulnerability include 4 (four) aspects, namely economic, social, institutional, and ecological/physical aspects. The final value of vulnerability will be categorized into 3 categories, namely: (a) 0-1.66 = very vulnerable; (b) 0.67-3.33 = vulnerable; and (c) > 3.34 = invulnerable. Social resilience analysis is used to calculate the capacity to overcome shock and stress/pressure. By looking at how big the "shock/pressure" is on the community. The final value of the resilience level will be categorized into 3 categories, namely: (a) > 6.67-10 = Resilient/Strong; (b) 3.34-6.66 = moderate resilience; and (c) 0-3.33 = Not Resilient (Weak).

Result and Discussion

Fisherman Household Vulnerability

The availability of fishery resources greatly influences the social life of fishing communities so that changes in the utilization of fishery resources will have an impact on the resulting social and economic behaviour so that social systems and sectors that depend on fishery resources must adapt in a way those changes with changes in distribution and productivity. Fishery species, because changes in the environment and their impact will have a greater effect on the social and cultural quality of life in society (Mulyadi, 2007; Purwanti, 2010). The vulnerability assessment has focused primarily on economic and social aspects (Wongbusarakum et al., 2011). But the relationship of humans affected by the physical environment and ecosystems and their capacity to cope with and adapt to new situations plays an important role in the degree of vulnerability to change (Nguyen et al., 2013; Keshavarz et al., 2017). In other words, societies with different capacities to respond to change are likely to result in different levels of vulnerability (Adger, 2006). Therefore it is important to understand social vulnerability by carrying out biophysical and socioeconomic assessments in an integrated and complementary way (Adger, 2000).

One of the factors affecting the utilization of fishery resources in the research period is the Covid-19 pandemic. The restricted fishing activities of fishermen have an impact on decreasing the amount of production so that it also has an impact on the fishermen's household economy (Mulyasari & Arianti, 2015; Triwindiyanti et al., 2018; Septiana, 2020). In assessing the level of vulnerability, there are 4 aspects of livelihood vulnerability, namely economic aspects, social aspects, institutional aspects and ecological/physical aspects presented in the Table 1 (Saliem & Ariani, 2016).

Table 1. Analysis of Social Resilience in Jayapura City Source

Aspect	Variable Livelihood	Indicator	Indicator score	Variable score	Aspect Score
Economy Aspect	Production tools	Equipment for production	3.50	2.78	2.20
		There is sharing of means of production with other parties	2.00		
		Receiving assistance of means of production from the government or non-government	2.50		
		The maintenance of the means of production is shared	3.10		
	Production cost	Independent source of production costs	3.20	1.60	

Aspect	Variable Livelihood	Indicator	Indicator score	Variable score	Aspect Score
		Receives government subsidies annually	0.10		
		There is production cost assistance from other parties	1.50		
	Income	The main type of work carried out as a source of income	4.00	1.04	
		Have an alternative source of income	0.50		
		Family income per capita >=UMR	0.10		
		The ratio of income to expenses	0.10		
		Family members have other sources of income	0.50		
	Market	There is a clear production market	4.00	3.40	
		The price of the product is determined	2.80		
	Savings	There is savings every time you do production	2.50	2.17	
		If you don't do production, you still have savings	2.00		
		Have savings to develop production business	2.00		
Social Aspect	Fulfillment of basic needs	Level of education	2.50	2.98	2.34
		Residential area	2.80		
		The ability of the head of the family to earn income	3.50		
		The ability of family members to meet basic needs	3.10		
	Social network	The existence of savings and loans between communities	1.10	1.70	
		Social safety nets (village contributions or funds) are available	1.50		
		There is cooperation in solving problems	2.50		
Institutional Aspect	Community Development	Society joins social organizations	0.50	2.38	2.38
		There is a financial institution (bank or non-bank)	3.50		
		There are companion institutions, counseling or coaching from the government or non-government	3.00		
		There is a structured marketing agency to sell fishermen's catch	2.50		
Ecology Aspect	Land Resources	Potentially exploited resources available	5.00	4.60	3.88
		Guaranteed resources to be utilized	5.00		
		The fishing area is open access	5.00		
		Resources are classified as shared resources	5.00		
		There is a land dispute	3.00		
	Consumption Food	Food is available all the time for the community	3.00	3.13	
		Main food staples are always available	2.50		
		There was a shortage of staple foods	3.50		
		There are local food ingredients as an alternative to the main food ingredients	4.30		
		Family food consumption according to 4 healthy 5 perfect	3.00		
		easy access to clean water suitable for consumption	2.50		
	Health	There is a health facility closest to the house	4.50	3.92	
		Family life expectancy	4.00		
		Diseases that occur regularly or are chronic and epidemic	4.00		
		The emergence of a new epidemic disease	5.00		
		Number of permanent houses with good sanitation	3.00		
		Households with MCK	3.00		
The Average Vulnerability Level					2.70

Information: > 0.1-1.66 : very vulnerable; 1.67-3.33 : vulnerable; 3.34-3.88 : invulnerable

From Table 1 the results of the analysis above, it can be seen that the level or level of vulnerability (vulnerability) of fishing communities in Jayapura City is included in the VULNERABLE category, with a value of 2.70 or <3.34 as the lowest limit for conditions that are INVULNERABLE. When viewed from the most vulnerable aspect, it is known that the economic aspect is the most vulnerable, with an index value of 2.20, while the ecological aspect is a strong aspect with an index value of 3.88. The radar graph depicting the vulnerability index for each aspect is shown in Figure 1.

If viewed based on the vulnerability variable, the variable that has a high enough value is the variable land resources, food/consumption, health and markets, with an index value above 3. The land resource variable has the highest index value, namely 4.60, this is because the area fishing is shared property and available fishery resource potential is shared property, although other variables are classified as very vulnerable, including

income variables and production costs which have a variable value of > 1.67. This is in line with the findings by Lisa (2015) and Klara et al. (2019) stating that the number of catches has a significant effect on the income of fishermen in Jayapura City. This means that during the Pandemic the number of fishermen's catch decreased drastically, resulting in a decrease in the income of local fishermen. Comparison of the index of each vulnerability variable is shown in Figure 2.

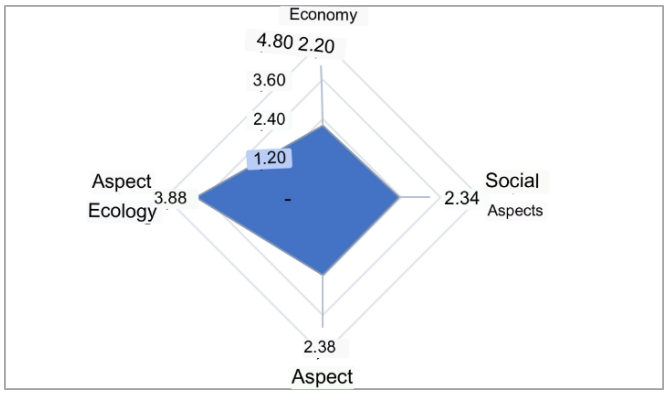

Figure 1. Radar graph of fishermen's livelihood vulnerability index in Jayapura city

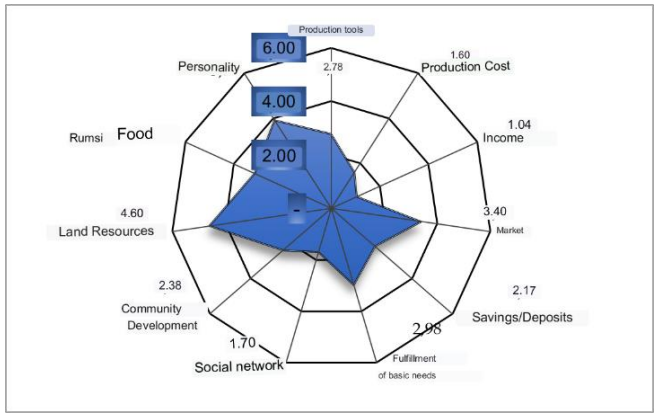

Figure 2. Vulnerability index radar graph for each livelihood variable

Based on the results in the graph above, it can be seen that the variables that are still vulnerable to the livelihood vulnerability of fishermen in Jayapura City are in the aspects of income and production costs, so that it needs to be strengthened as a priority in the intervention of development programs and management. Several weak variables, related to inadequate livelihood indicators in it, which need to be prioritized for addressing with program interventions are as follows.

Table 2. Fishermen's Vulnerability Indicators in Jayapura City

Vulnerability Variables	Indicators That Need to be Strengthened
Production cost	Sources of capital/costs are difficult to access.
	The incentives/subsidies obtained are minimal.
	Sources of production costs from other institutions/parties are minimal.
Income	The main work carried out as a source of income is less than optimal.
	Minimal alternative sources of income.
	Family income per capita <=UMR.
	The ratio of income is not proportional to expenses.
	Other sources of income for family members are minimal.

Jayapura City Fishermen Social Resilience

Social resilience is needed as a reference in the management of natural resources and the environment, this is because the value or level of social resilience shows the capacity or ability of a system to deal with pressure (Turner et al., 2003; Sukiyono et al., 2016; Tajerin et al., 2017). As explained by Abesamis et al. (2006), Bahadur et al. (2010), Kolopaking et al. (2014) social resilience is defined as the ability of a group or community to cope with external pressures and disturbances as a result of social, political and environmental changes. This definition highlights the fact that social resilience has economic, spatial and social dimensions and thus requires interdisciplinary understanding and analysis at multiple scales. It differs fundamentally from ecological resilience by having the added capacity of humans to anticipate and plan for the future (Sakuntaladewi & Sylviani, 2015; Suwandi, 2017).

According to Sunarti et al. (2011), studying socio-economic resilience is very important because resource utilization activities are increasingly massive due to pressures to fulfill human needs which tend to be exploitative. On the other hand the absence of effective management makes the use of resources limitless so that it will become more exploitative and this makes changes towards resource damage which will put pressure on the coastal environment. It also will decreases productivity which has the potential to threaten the resilience of the ecological-social systems contained therein (Nurjanah et al., 2013).

Based on the results of a social resilience study of fishermen in Jayapura City in the face of the Covid-19 pandemic, it was found that the lowest level of social resilience was in the social aspect, followed by the economic, institutional and ecological aspects as can be seen in the following figure.

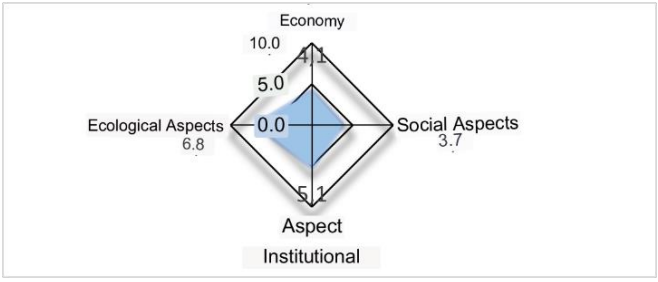

Figure 3. Aspects affecting the level of social resilience of fishermen in Jayapura City

The value of the social aspect of the social resilience of fishermen in Jayapura City is moderate, ranging from 3.34 to 6.66 with a resilience value of 3.70. Likewise with the economic and institutional aspects which have a moderate level of social resilience with a score of 4.10 on the economic aspect and 5.10 on the institutional aspect. In detail for each factor, the achievement of the social resilience level of fishermen in Jayapura City refers to the main principles for building resilience and the contextual variables are explained as follows.

Maintaining Social Relations during the Covid-19 Pandemic

The social aspect is the aspect that has the most impact with the Covid-19 pandemic in Jayapura City, various social restriction policies issued by the Jayapura City government in preventing the spread of Covid-19 have had the impact of reducing social activity. Jayapura City fishermen's strategy in dealing with the Covid-19 pandemic is a strategy to prevent or reduce pressure or stress due to the Covid-19 pandemic. When viewed based on the resilience value, the social aspect has a moderate level of resilience with a resilience value between 3.34-6.66, namely 3.70.

Figure 4. Achievement of the social resilience level of fishermen in Jayapura City on social aspects

The social aspect has variables with different resilience values. The variable with the lowest resilience value is the social safety net (dues or village funds) and the highest value is the variable that there is cooperation in solving problems, this is based on real conditions at the research location where fishing communities carry out fishing activities without getting village funding assistance Respondent fishermen remain in touch. With the Covid-19 pandemic limiting the social activities of fishermen so that it affects the level of resilience in social aspects which is classified as moderate.

Creating Economic Opportunities during the Covid-19 Pandemic

The Covid-19 pandemic in Jayapura City has indirectly impacted the fishermen's economy in Jayapura City. The capture fisheries activity of fishermen in Jayapura City, which is classified as a one day trip, has an effect on the amount of fishing household expenses in spending on fishing needs each trip. With the Covid-19 pandemic affecting access restrictions in and out of Papua Province, it has resulted in high prices of goods in Jayapura City, thereby indirectly increasing the expenditure of fishing households. Based on the calculation of the value of social resilience, the value of the economic aspect is classified as moderate, with the resilience value being between 3.34-6.66, namely 4.1.

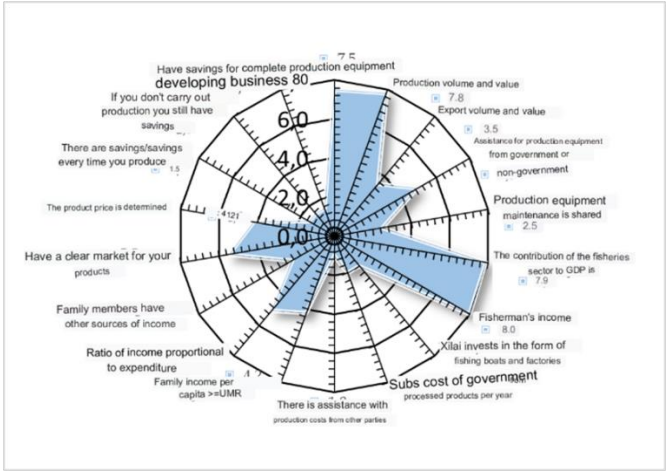

Figure 5. Achievement of the social resilience level of fishermen in Jayapura City in the economic aspect

The variable value on the economic aspect varies with the lowest value on the variable the presence of production cost assistance from other parties with a social resilience value of 1.0 and the highest variable value is the fishermen's income variable with a resilience value of 8.0, this is because the respondent fishermen in the study area carry out activities catching fish without getting operational cost assistance from other parties and fishermen's income is a very important variable in the fishermen's household economy.

Maintaining the Stability of Potential Resources during the Covid-19 Pandemic

The ecological aspect is an aspect with a high level of resilience based on the calculation of the value of social resilience, which has a value of 6.80, which means

that the ecological aspect is the aspect that is most able to survive among other aspects during the Covid-19 pandemic (Holling, 1973), this is due to the high potential of fishery resources in the area of Jayapura city. Limiting operational time to go to sea is one of the factors affecting the potential for fishery resources to be maintained during the Covid-19 pandemic in Jayapura City.

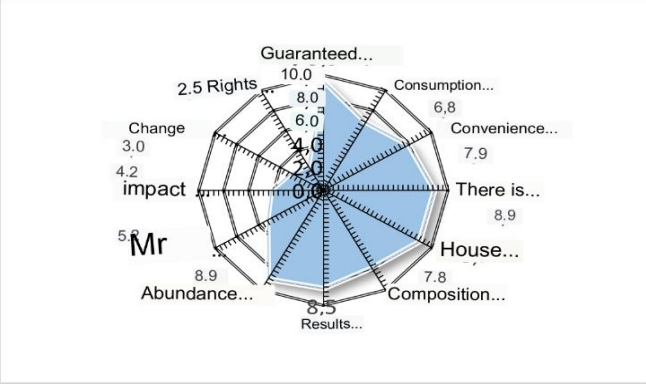

Figure 6. Achievement of the social resilience level of fishermen in jayapura city in ecological aspects

The existence of the Covid-19 pandemic has greatly affected various aspects of fishermen's households in Jayapura City. The ability of fishermen to survive in the midst of the Covid-19 pandemic has made fishermen try to find ways to survive in the face of the Covid-19 pandemic.

Conclusion

The economic aspect is a very vulnerable aspect for fishing households during the Covid-19 pandemic in Jayapura City and the ecological aspect is the aspect that is most able to survive during the Covid-19 pandemic. The level of social resilience of the fishing community in Jayapura City is at a moderate level, which has a resilience value of 4.90. Aspects with a moderate level of resilience are social aspects and aspects with a high level of resilience are ecological aspects.

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Conflicts of Interest
No Conflict of interest.

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