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Increasing the Social Resilience: Ecology of Coastal Communities of Merauke Regency, Papua Province, Indonesia

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Abstract:
One of the groups of people vulnerable to poverty in Merauke is people living in coastal areas and depending on their families for their livelihood from the availability of natural resources, namely the ecology of the coastal area from the fisheries and non-fishing sectors. The culture or behavior of the people in an area can form a new behavior while still prioritizing local wisdom to maintain sustainable ecological, social, and economic functions and improve community welfare. Our research aims are to identify vulnerable groups and strategies to increase resilience and to design adaptation models for cultural elements. Our research was conducted in two coastal areas in Merauke Regency, Papua Province, Indonesia using a qualitative descriptive research approach with a case study method. The object of our research is traditional fishing community groups and small fishers. The resilience analysis focuses on four indicators of community vulnerability. The study concluded that the fishers' group had a higher level of resilience to change and uncertainty than the farmers, farm laborers/fishers, traders, and transportation groups. Resilience is increased by planting mangroves and conservation with an incentive system approach prioritizing local cultural wisdom, human resource development to improve self-organization and coordination of various kinds of knowledge, and job diversification as an alternative source of local resource-based community livelihood. Increasing the resilience of the Merauke coastal community is carried out by prioritizing local wisdom, namely a cultural system that prioritizes the sustainability of community livelihood sources, especially culture or efficiency in taking natural resources as needed and not excessively. For this, real commitment is needed from all parties by involving coastal communities in the planning, implementation, and evaluation of cultural adaptation systems for

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the sustainable improvement of community welfare.

Keywords: resilience, fishers, coastal communities, ecology.

提高社会复原力：印度尼西亚巴布亚省梅拉克摄政沿海社区的生态

摘要：
默拉克易受贫困影响的人群之一是生活在沿海地区的人们，他们依靠自然资源的可用性（即渔业和非渔业部门的沿海地区生态）为生。一个地区的人们的文化或行为可以形成一种新的行为，同时仍然优先考虑当地的智慧，以维持可持续的生态、社会和经济功能并改善社区福利。我们的研究目的是确定弱势群体和策略以提高复原力并设计文化元素的适应模型。我们的研究是在印度尼西亚巴布亚省梅拉克摄政的两个沿海地区进行的，采用定性描述性研究方法和案例研究方法。我们的研究对象是传统渔业社区群体和小渔民。复原力分析侧重于社区脆弱性的四个指标。该研究得出的结论是，渔民群体比农民、农场工人/渔民、贸易商和运输群体具有更高的应对变化和不确定性的能力。通过种植红树林和保护以增强恢复力，采用激励系统方法优先考虑当地文化智慧，人力资源开发以改善各种知识的自我组织和协调，以及作为当地资源型社区生计的替代来源的工作多样化。通过优先考虑当地智慧来提高默拉克沿海社区的复原力，即一种文化系统，优先考虑社区生计来源的可持续性，特别是文化或根据需要而不是过度利用自然资源的效率。为此，需要各方做出真正的承诺，让沿海社区参与文化适应系统的规划、实施和评估，以实现社区福利的可持续改善。

关键词：复原力、渔民、沿海社区、生态。

1. Introduction

Community-based natural resource management is widely used in several regions to improve the community's adaptive capacity to environmental changes by looking at endogenous and exogenous factors such as technical, financial, and legal factors, seen from livelihood, political and environmental factors, social, economic, scale, knowledge, community, and cultural aspects involving values, ethics involving multiple stakeholders (Armitage, 2005; Masozera et al., 2006; Thompson et al., 2003; Wiber et al., 2004) to avoid overexploitation of fishery resources (Cudney-Bueno & Basurto, 2009) using local community rules (Léopold et al., 2013) and to improve community capacity in managing social development and infrastructure independence (Darma et al., 2012). In addition, natural resource management methods can use community participatory methods (Kearney et al., 2007).

One of the models that can be used is Integrated Coastal Area Management emphasizing strengthening the capacity of development actors and local communities to remain relevant in formulating eco-centric policies in coastal resource management (Nagabhatla et al., 2019) by increasing the capacity of local communities through community empowerment by improving the partnership system so that the community can be independent by using a religious-value approach to increase understanding of generalizing local development in coastal areas (Cinner et al., 2018; Matthoriq & Suryadi, 2014). A different study was carried out by increasing community adaptation to change and uncertainty (Cinner et al., 2018). One of the efforts that can be made is to improve fishing equipment infrastructure (Sinaga et al., 2019). However, this does not guarantee to increase the number of fishers' catches and people's frequency, causing poverty in coastal communities supported by inefficient lifestyles when earning more income, low fishing technology mastery due to limited capital and possibility of determining selling prices (Amir et al., 2019). The decline in fishing volumes can be caused by the adaptation pattern of coastal communities, strongly influenced by economic conditions (Sariffuddin & Wijaya, 2014), which causes knowledge, experience, and community response to the environment to be low (Wasak, 2012).

Cultural and human ecosystem services are important elements in the socio-ecological (SES) and economic systems, placing humans as the main object and improving coastal and marine resource management (Aswani et al., 2018; Leong et al., 2019; Leslie et al., 2018). In addition, coastal vulnerability mapping integrated into the coastal vulnerability assessment diagram can contribute to using the integrated coastal vulnerability assessment matrix and diagram and serve as guidelines for coastal management actions (Lins-de-Barros, 2017) or develop

integrated social and economic vulnerability models at the geographic area level using census data to measure populations based on social variability (Pricope et al., 2019). The Pella-Tomlison model can improve the management of red snapper fisheries from 1980 to 2014 (Koeshendrajana et al., 2018).

The novelty of our research is that acculturation of culture or community behavior in an area can increase the adaptation of fishing communities to environmental pressures. Cultural differences and people's behavior toward the positive values adopted can reduce the impact of internal (human) and external (environmental) pressures, so that community livelihoods are sustainable and welfare increases. Cultural acculturation is carried out by improving local community institutions to improve ecological functions, namely increasing the area and function of mangrove areas. The ecological functions of mangrove areas provide economic and social benefits for coastal communities.

Based on the description of the phenomenon in several regions in Indonesia and several countries on the coast, we conduct a study of natural resource management with an ecosystem approach by adapting local cultural elements used by the community and influencing its social and economic aspects. In Merauke, coastal communities' lives depend on their natural resources (Widiastuti et al., 2016), and they still live below the poverty line (Badan Pusat Statistik Kabupaten Merauke, 2020; Imbanop et al., 2019), which is caused by the climate change (Rahail et al., 2019; Untari et al., 2018a, 2018b) and affects their fishery and non-fishery livelihoods (Untari et al., 2021). Then, the problem statement in this research plan is that coastal ecosystems in the Merauke district have been damaged from period to period and have impacted coastal ecology, affecting the social and economic systems of fishing communities. Based on the problem statement above, the research question is, how is the model to improve resilience by adapting the cultural elements of coastal communities in Merauke Regency, Papua Province, Indonesia? To answer the question, the authors formulate two specific research objectives: 1) Analyzing the level of resilience and strategies to increase resilience in coastal community groups; 2) Designing a model of adaptation of cultural elements to increase the resilience of coastal communities.

2. Methodology

2.1. Research Design

The research design used in answering the research objectives is case study research with a qualitative approach (Creswell, 2009). This study uses four approaches to community behavior in dealing with changes and uncertainties in coastal resources (Folke et al., 2002) have identified critical inter-temporal and spatial interacting factors needed to address natural resource dynamics during periods of change and reorganization.

2.2. Research Place and Time

The research was carried out in Merauke Regency in 2021. The area or sample area observed was in Merauke District and Naukenjerai District, Merauke Regency. Selecting the research area is based on data from the Merauke Regency Fisheries Service for 2019 that the two districts have coastal areas and settlements, and the community's main source of livelihood is fishery.

2.3. Data Collection

Research data was collected in the form of primary data and secondary data. The study's primary data were collected by interviewing respondents from coastal communities in Merauke and Naukenjerai Districts with structured questions to collect data on the adaptability of the community to changes and uncertainties in coastal areas by using a scoring on the sustainability aspect of community livelihoods in five aspects: natural, human, social, financial, and physical. In addition, the collection of coastal community resilience data is focused on four categories: 1) Learning to live in change and uncertainty; 2) Developing diversity for reorganization and renewal; 3) Combining various kinds of knowledge; and 4) Creating possibilities for self-organization (Folke et al., 2002). Secondary data is obtained from literature studies of various sources such as books, national and international journals, research reports, activity reports, and other data sources relevant to research on socio-ecological systems between communities and the existence of mangrove forests.

2.4. Respondent Determination Technique

Research respondents used in this study are respondents who know and understand the problems studied. Determination of research respondents using an expert survey consisting of:

a. The respondents among people living in the study area were selected using a proportional random sampling method. Their total sample was 121, consisting of 56 respondents being local fishers and 65 respondents being non-local fishers spread over two research locations: Merauke and Naukenjerai Districts.

b. Respondents from the experts. Respondents from the experts were determined using the purposive method or on purpose. The experts were selected using the following criteria:

1. Experience or knowledge about the field studied;
2. A reputation, position (incompetence) with the field studied;
3. High credibility, willingness, having funds, or being in the location studied.

2.5. Data Analysis Method

Adaptation capacity is the ability to withstand disturbances or shocks that occur, in this case, the increase in tidal water or the rise in water level to land. Adaptation capacity will refer to the four interaction factors developed by Folke et al. (2002) related to socio-ecological adaptation. The value of adaptive capacity will be measured by the level of adaptation between values of 0 and 3. The adaptive level with a value of 0 means that it is not adaptive with an adaptation level of 0-25%; 1 means slightly adaptive with an adaptation rate of 26–50%; 2 means quite adaptive with an adaptation level of 51–75%; and 3 means very adaptive with an adaptation rate > 71%.

The analysis based on the socio-ecological resilience perspective is expected to obtain an adaptive management model to create a socio-ecological system adapted to the pattern of application of cultural elements used by coastal communities in utilizing marine resources and a socio-ecological model system applied in coastal communities living in coastal areas. Forming a cultural system can improve the adaptation of coastal communities to environmental changes and maintain livelihood sustainability. Based on this, the concept of cultural adaptation adopts the notion of adaptive co-management, which is defined as a flexible system of institutional arrangements. Ecological knowledge is tested and reviewed as a dynamic, continuous, organizational process of learning-by-doing that involves the community and various stakeholders according to the duties and responsibilities of management in the natural resource utilization system (Olsson et al., 2004).

3. Result

Judging from asset capital, several sources of life can be managed and developed that have the potential as a source of income for the community as individuals and a social unit in community groups and the environment. The identified capital assets are natural capital, human capital, financial capital, physical capital, and social capital.

Based on the availability of capital assets in the coastal areas of Merauke Regency, precisely in the Merauke and Nauknejerai Districts which became the observation sample of this study, we identified three groups of alternative livelihood sources that the community could develop: 1) Fisheries sector businesses, such as capture fisheries business, processing business fisheries, and marketing; 2) Business in the agricultural sector, such as rice farming and gardening; 3) Service sector businesses, such as transportation, labor (fisherman/farmer labor), and traders. From the three groups, it was concluded that three jobs or professions had to be leveled off against four community resilience indicators so that the community was more adaptive to change and uncertainty: fishers, farmers, and people working in the service sector.

3.1. SES Resilience of Coastal Communities

Resilience analysis focused on four assessment indicators was carried out in research, namely: 1) the ability of the community to learn to live in change and uncertainty; 2) the ability to develop oneself in organizing and reforming; 3) the ability to combine various kinds of knowledge to deal with change and uncertainty; 4) the ability to create for self-organization. The percentage of the resilience level of coastal communities in Merauke and Naukenjerai Districts based on the determinants is presented in Figures 1 and 2.

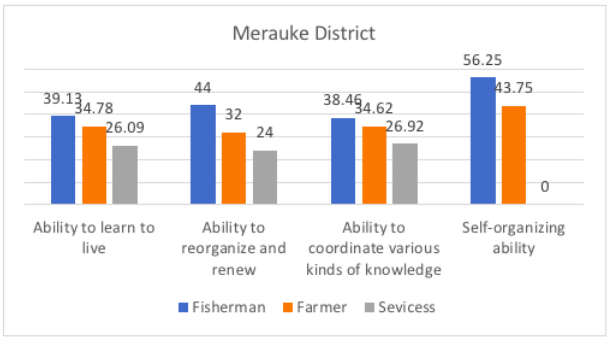

Figure 1. Percentage of coastal community resilience level based on determinants in Merauke District

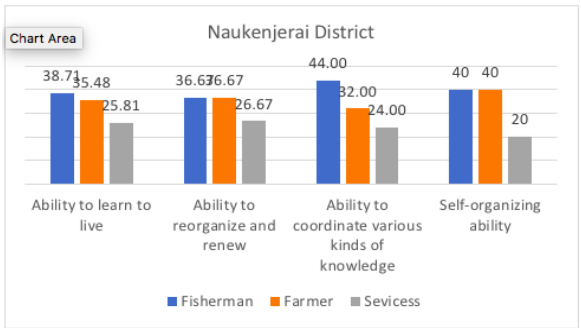

Figure 2. Percentage of coastal community resilience level based on determinants in Naukenjerai District

Figures 1 and 2 show that the levels of resilience of coastal communities in Merauke and Naukenjerai Districts differ. Fishers in Merauke District have the highest percentage of self-organization, reorganization, and renewal, to learn to live and manage various kinds of knowledge compared to groups of farming communities, fishers/farmers, traders, and transportation services. The same thing happened in Naukenjerai District. However, on the coast of Semarang City, there are people vulnerable to changes and environmental uncertainty: farmers/fishers, industrial workers, civil servants, and others (Susanto et al., 2012). Unlike farmers and the service sector, even with low education, fishers in both districts are armed with experiences and knowledge, enabling them to face changes and environmental uncertainty successfully.

3.2. Strategies to Increase Community Resilience in Merauke and Naukejerai Districts

The social, economic, and ecological dynamics analyzed by SES and resilience include community income, locally-generated revenue from the coastal and marine fisheries, preserving the environment by the government and local communities, increasing participation in coastal communities dealing with future changes and uncertainties, increasing the role of local institutions, and improving regulations relating to coastal resource management. The interventions given to the six factors that affect the social, economic, and ecological aspects of coastal communities in the two districts as research areas are 1) making irrigation equipped with a sluice system, 2) providing intensive support to the community in planting and conservation, 3) developing human resources, 4) construction of embankments, 5) development of paddy fields and gardens, 6) job diversification by encouraging the growth of the fishing industry, 7) Mangrove planting. The results of weighting the criteria and sub-criteria on the observed factors based on the previous SES and resilience analysis are presented in Table 1.

Table 1. Criteria weight value for coastal resource management in Merauke and Naukenjerai Districts (Primary data, 2021)

Criteria	Subcriteria	Districts' Total Scores	
		Merauke	Naukenjerai
Economy		**7.30**	**4.75**
	Community Income	4.50	3.50
	Local revenue contribution	2.80	1.25
Social		**6.50**	**7.25**
	Local institutions	4.50	4.00
	Rules and Policies	2.00	3.25
Ecology		**8.00**	**7.00**
	Sustainable Environment	4.30	4.00
	Participation	3.70	3.00

Table 1 shows that ecological criteria are the most important criteria compared to economic and social criteria on the Merauke coast to increase the resilience of coastal communities. Meanwhile, Naukenjerai shows different scoring results, namely that social criteria are more important than ecological and economic aspects. However, simultaneously in the two districts, the highest score for each sub-criterion is the same, even though the numbers differ. On the economic criteria, that income is more important than the contribution to locally-generated revenue contribution from coastal resource management. This shows that, for now, the coastal communities in Merauke and Naukejerai need to increase the income of traditional fishing families.

Meanwhile, on social criteria, the development and performance of local institutions are more important than the rules and policies of coastal management in the two sample districts of the research location. In every coastal village, traditional or local institutions play an important role in community behavior in managing coastal natural resources. The traditional fishing communities in Merauke and Naukenjerai Districts are dominated by indigenous peoples who have rules or behaviors passed down from generation to generation from the ancestors of the original Merauke community, the Marind Tribe. So, regional regulations or policies on coastal area management must pay attention to the local wisdom of coastal area management. For ecological criteria, Merauke District has a higher score than Naukenjerai District. The sub-criteria for sustainable environment in both districts have a higher importance level than community participation. This is because the existence of the coastal environment has an important influence on the social and economic life of the community. After all, coastal communities depend on coastal environmental resources, namely fishery and non-fishery. The coastal environment is preserved by using an incentive system for the community, such as the mangrove planting program carried out by local coastal communities.

3.3. Economic Criteria

The results of analyzing the weight of the economic criteria on the best alternative in increasing the resilience of fishing communities in Merauke and Naukenjerai Districts are presented in Figures 3 and 4.

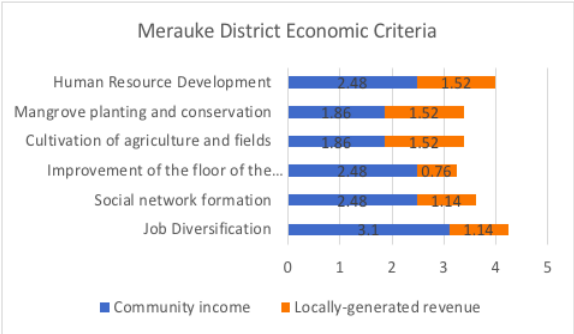

Figure 3. Priority of Merauke District's coastal resource management model for economic criteria

The results of calculating the final score for the economic criteria are presented in Figure 3, showing that the four best alternatives to increase community resilience in the coastal Merauke District from the sub-criteria of community income are job diversification, human development, social network formation, and raising the floor of the house or making houses on stilts. Of the four alternatives, it can be a priority in the economic development of coastal communities in the Merauke District. The results of the survey in the field show that the community has the main skills as fishers and artisans as a side job if they cannot go to sea or are not catching fish. This occurs in non-local community groups. Meanwhile, the local people on the coast, other than fishers, will also become porters or construction workers. Based on this phenomenon, it is necessary to diversify jobs for coastal communities such as the fishing industry that can absorb labor and provide new market opportunities for fish catches in the industry. In

addition, to increase processed fishery products, coastal communities in Merauke need to increase social networks for marketing processed fish products to increase the market. Mangrove planting and conservation, agricultural cultivation, and gardening are alternatives with the lowest score because they are considered to require more time and resources to develop the economic sector of coastal communities.

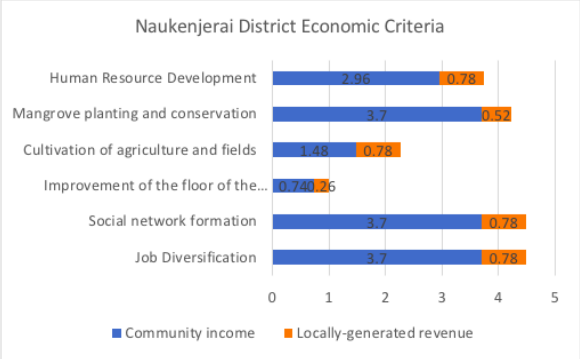

Figure 4. Priority of Naukenjerai District's coastal resource management model for economic criteria

The best alternative to increase community resilience in facing coastal changes and uncertainties in Naukenjerai District, presented in Figure 4, is different from what happened in Merauke District. The priority alternative in coastal resource management is the highest score on job diversification, social network formation, and mangrove planting. Ecological criteria have become one of the priorities to increase community resilience in economic criteria. This is because Naukenjerai District is a protected area included in Wasur National Park. In addition, the people living in Naukejerai are dominated by indigenous peoples who have lived for generations and depend on coastal natural resources and forests for their livelihood. Improving the quality of coastal and forest ecology by planting mangroves and conserving the environment is hoped to improve and maintain natural ecology that can provide a source of sustainable community livelihoods. Alternative job diversification, the formation of social networks, and human resource development are alternatives that have become a priority to increase the resilience of coastal communities in Naukenjerai and Merauke Districts. However, fishers' level of education and skills is relatively low, and social networks, especially marketing networks for catches and processed fish products, are limited. Wetland agricultural cultivation and gardens/fields are an alternative with a low score because efforts to increase cultivation and gardens require new land by clearing forests.

3.4. Social Criteria

The score of the weighted analysis of the social criteria with the sub-criteria of increasing the role of local institutions and improving the rules and policies on coastal management towards resilience strategies based on the analysis of SES and vulnerability in Merauke and Naukenjerai Districts are presented in Figures 5 and 6.

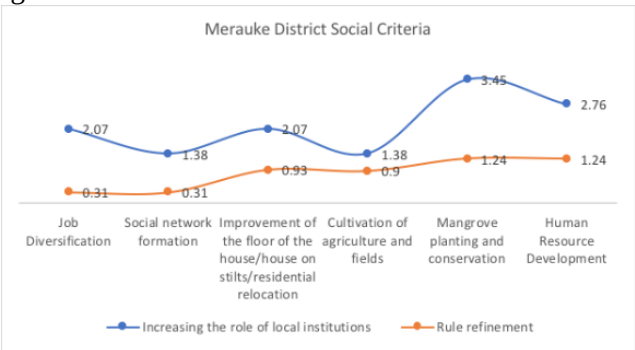

Figure 7. Priority of Naukenjerai District's coastal resource management model for social criteria

Based on the results of the analysis scores on the social criteria of the coastal community of Merauke District, the sub-criteria for increasing the role of local institutions has the highest score compared to the improvement of rules and policies. Local institutions can play a role in mobilizing long-term resources to be more productive so that resources can be utilized efficiently and sustainably with site-specific knowledge (Uphoff, 1992). The strategy chosen to increase the resilience of coastal communities in Merauke District on economic criteria is the best alternative, namely mangrove planting and coastal area conservation activities, then human resource development, job diversification, and raising the house floor or making houses on stilts. As the capital city of Merauke Regency, Merauke District has adequate facilities and infrastructure from education, health, and market facilities, so the strategy is not felt as important enough to be prioritized again. In addition, the strategy to increase the cultivation of wetland agriculture and gardens/fields for the Merauke District is ineffective because coastal communities do not have sufficient land for these businesses. If prioritized, it will require high costs.

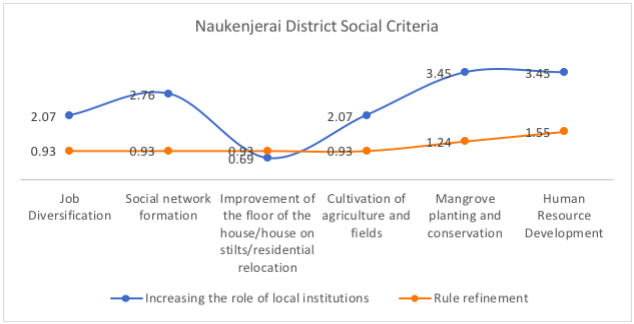

Figure 8. Priority of Naukenjerai District's coastal resource management model for social criteria

The phenomenon of social criteria in the Naukejerai District is not much different from Merauke District. The chosen alternatives are making coastal communities resilient to future changes and

uncertainties, planting mangroves and environmental conservation activities in the coastal area of Wasur National Park, developing coastal human resources through increasing understanding of environmental balance, and improving work skills to manage coastal natural resources of economic value. The nature tourism sector is a national park area with high ecological value, including its coastal areas (Krittayaruangroj et al., 2021). Mangrove planting and conserving coastal areas are the main programs or strategies because the rate of coastal abrasion is rising, plus human activities are mining sand beaches and using wood or mangrove trees as firewood for household fuel or burning shellfish. In addition, the formation of social networks is an alternative with a low score. At present, the diversity of the people in Naukenjerai with the inclusion of outside cultural influences has provided a significant social influence. Inter-tribal marriages cause the function of traditional institutions to fade from generation to generation.

3.5. Ecology Criteria

The results of analyzing the weight of the ecological criteria on the best alternative in increasing the resilience of fishing communities in Merauke and Naukenjerai Districts are presented in Figures 9 and 10.

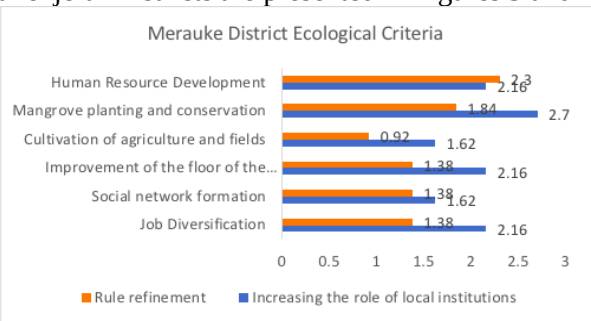

Figure 9. Priority of Merauke District's coastal resource management model for ecological criteria

Ecological criteria in Merauke District become the highest-priority alternative strategy, namely the role of local institutions in mangrove planting and coastal area conservation. Parties involving relevant stakeholders have carried out efforts to restore the function of mangrove forests in coastal areas threatened by tidal and tidal currents. Several parties have planted mangroves in the coastal area of Merauke District, namely the Merauke Regency Environmental Service, Merauke Navy XI, Universities, the Papua Provincial Forestry Service Supervisory Office in Merauke, and Non-Governmental Organizations concerned with environmental issues. Collaborative activities have been carried out involving the local community, but this program has not run optimally. Alternative strategies that can be used to increase the resilience of coastal communities in Merauke District that get high scores are job diversification and house floor elevation or making houses on stilts for people living on the coast. It is possible to diversify the work of coastal communities in Merauke District towards a fishery product processing industry that can compete with the same product from outside. Job diversification is considered to reduce the dependence of coastal communities on negative coastal ecological management.

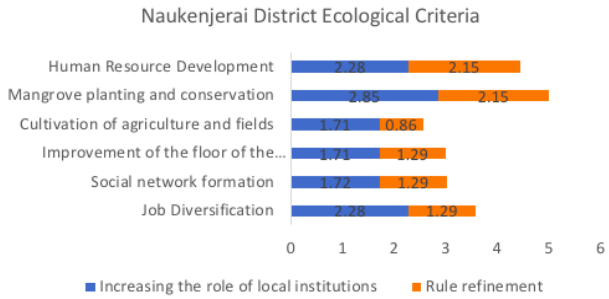

Figure 10. Priority of Naukenjerai District's coastal resource management model for ecological criteria

The ecological criteria of Naukenjerai District that can increase the resilience of coastal communities to change and uncertainty are depicted in Figure 10, indicating that increasing the role of local institutions such as traditional institutions is more important than other alternative strategies. Communities in Naukenjerai are dominated by indigenous peoples who have lived on the coast of Naukenjerai for generations, which are designated as a national park area. Ecological damage to coastal areas occurs naturally and non-naturally with human intervention utilizing natural resources for economic purposes without paying attention to the sustainability of the local environment. For example, coastal damage is naturally caused by tides, while non-natural damage is caused by quarrying beach sand for building materials and logging of wood used to fuel shellfish.

Weighting the criteria on the social, economic, and ecological dimensions is carried out to obtain the highest score and determine the most influential criteria in increasing the resilience of coastal communities to changes and uncertainties in the coastal waters of Merauke. The ecological criteria have the greatest influence on increasing community resilience in the coastal district of Merauke. However, partially, the economic sub-criteria, namely an increase in people's income, can be considered to increase community resilience (Lesmana et al., 2021). Meanwhile, the results of weighting on social, economic, and ecological criteria in Naukenjerai show that the social criteria have the highest score, followed by the ecological and economic criteria. Partially restoring environmental functions and strengthening local institutions in the village are considered the most capable of increasing the resilience of coastal communities, which will be followed by the sub-criteria for increasing community income.

Alternative policy options resulting in Merauke and Naukenjerai Districts are 1) making irrigation equipped

with a sluice system, 2) providing intensive support to the community in planting and conservation, 3) developing human resources, 4) making embankments, 5) development of rice fields and gardens, 6) job diversification by encouraging the growth of the fishing industry, 7) Mangrove planting. The three best choices with the highest score were 1) mangrove planting, 2) human resource development, and 3) job diversification.

4. Discussion

The criteria and sub-criteria determine the main and supporting alternatives to increase community resilience. However, other criteria can influence decision-making related to coastal resource sustainability strategies, one of which is important in Papua in general, namely local culture and local wisdom. The culture or behavior of coastal communities, which has been handed down from generation to generation in daily life, is the efficiency of using natural products. Indigenous coastal or local communities must not take excessive agricultural products and are limited by customary boundaries. For example, people will cut down sago trees according to family consumption needs for a certain period and keep others growing. It is believed that, when humans are not wise in managing natural products, nature will be angry and no longer provide humans with food, or natural products will decline. In Merauke, the development of alternative food sources, namely agricultural cultivation as a food source, is carried out entirely with an organic farming system because people do not want to use chemicals in their agricultural system. This applies to all-natural product management. The concept of life behavior entrenched when formulated in a model to increase the resilience of coastal communities in Merauke and Naukenjerai Districts, Merauke Regency, by adopting the SES analysis with each criterion as a basis for decision-making is presented in Figure 13.

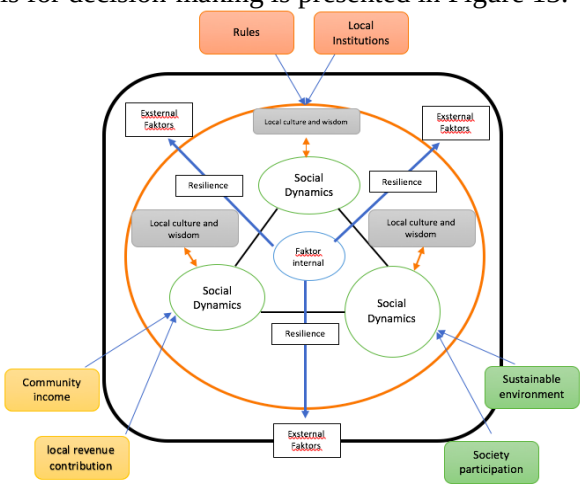

Figure 13. Model of adaptation of cultural elements for the sustainable welfare of coastal fishers

Community-based natural resource management must consider exogenous and endogenous variables to change circumstances, encourage learning, and build adaptive capacity in coastal communities (Sjafrie, 2018; Turner et al., 2016). This needs to be done so that the community obtains the right to the fishery and better facilities, improves resource management, and encourages the formation of new institutions (Thompson et al., 2003). Figure 13 illustrates a model of resilience to prepare for change and uncertainty to ensure the sustainability of community welfare by adopting elements of culture and local wisdom in sustainable development criteria that shape internal characteristics that influence development decision making in Papua in general and Merauke in particular. Among the internal characteristics in question are the determinants of resilience that can be intervened with elements of local culture/wisdom, namely 1) the ability to learn to live with change and uncertainty, 2) the ability to develop various ways of reorganization and renewal, 3) the ability to coordinate various kinds of knowledge, and 4) the ability to create opportunities for self-organization. The social dimension is related to the stakeholder and institutional structures. For improving community resilience, cultural approaches can be used to control the coastal natural resource management system. Indigenous peoples as humans and social systems are built by social organizations or controls and institutions, technology, population, knowledge systems, and norms or values built by the community (Ngoc et al., 2021; Sjafrie, 2018). Values or norms that can suppress ecosystem stability are intended, namely culture or local wisdom. Local culture or wisdom can be used for community empowerment in environmental management (Juniarta et al., 2013; Misni & Jarami, 2021; Untari et al., 2020). In addition, the customary rights owned by coastal communities can be used to prevent and resolve conflicts in the use of space in the environment from internal and external coastal areas using customary deliberations (Waluyo, 2014). It is like what the Lamera indigenous people have done in their rejection of activities that damage the balance of the ecosystem that can break the bonds of indigenous peoples with their ancestors (Untari & Herdjiono, 2019).

Ecological dynamics are natural components that can change quickly or slowly, affecting the fishing ground and the utilization of the mangrove ecosystem or being a valve for excessive exploitation of natural resources (Moita, 2017; Muliani et al., 2018). Internal characteristics will be influenced and affect the local culture/wisdom of the coastal area, a customary area with local wisdom in natural resource management whose existence will affect the ecology, social aspect, and economy of the surrounding community. The ideal model of coastal area management can put forward the values of local wisdom/culture that are synergized in coastal development by involving the government and

the community (Dewi, 2018). The values of local wisdom owned by the community can form ecological intelligence that is quite effective for efforts to preserve the coastal environment (Utina, 2012). Internal factors adapted to the local culture/wisdom system face external pressures, such as political pressures, policies, developments in science and technology, and global natural pressures. Therefore, internal characteristics can be improved with sub-priority criteria through changes through selected strategies on social, economic, and ecological aspects. In addition, the local culture/wisdom system has an advantage because coastal communities play an active role in development to increase income, preserve the coastal environment, and be flexible in resource management (Dewi, 2018).

The implementation is that coastal communities who depend heavily on coastal natural resources such as fishers/farmers, laborers, and services can increase their income so that welfare increases. For now, traditional fishing/farmer communities have a lower economy than other community groups, so they are not taken into account socially. The motivation of fishers to move forward is still low, but they have hope for a better life (Syahrizal et al., 2011).

5. Conclusions and Suggestions

Analysis of community SES resilience in Merauke and Naukenjerai Districts on four observation indicators shows that community groups in the coastal area of Merauke District, namely fishers, have better adaptability for self-organization, reorganization, and renewal, ability to learn to live and coordinate various kinds of knowledge. The same happened in Naukenjerai District. Strategies to increase community resilience/adaptation to change and uncertainty to ensure the sustainability of the economic welfare of coastal communities by considering social, economic, and ecological dynamics in Merauke and Naukenjerai Districts, namely by increasing the role of local institutions, increasing community income, and increasing the sustainability of coastal areas with selected strategies namely mangrove planting, human resource development, and job diversification by encouraging the growth of the fishing industry in Merauke Regency. Cultural elements as community behavior part in using natural resource management are adopted in a sustainable natural resource management model to harmonize the influence of internal and external factors impacting human behavior in the sustainable use of natural resources as a family livelihood source. For this, real commitment from all parties is needed, involving coastal communities in planning, implementing, and evaluating cultural adaptation systems for the sustainable improvement of community welfare.

The limitation of this research is that it could not observe how far the modern culture can reduce the value of local wisdom, which is the focus of development in Indonesia on improving the economy and social life status, but decreases ecological functions so that the social and economic environment quality for people's activities is disrupted.

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Authors' Contributions

UT: data collection, data tabulation, compiling original drafts, visualization, investigation, data analysis, and writing the manuscript. RD: conceptualization and editing the article. LF helped in writing and editing the article. AA conceived the idea and helped write and edit the article.

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