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READINESS FOR CLIMATE CHANGE: AN ANALYSIS OF SMALL-SCALE FISHERMEN IN TASIKMALAYA, WEST JAWA

Kesiapsiagaan Dalam Menghadapi Perubahan Iklim: Analisis Pada Nelayan Skala Kecil Di Tasikmalaya Jawa Barat

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ABSTRACT

Climate change is a significant challenge that impacts various sectors, including fisheries. The challenge must be anticipated by all fisheries stakeholders so that the fisheries management process can run sustainably. This study aims to determine the level of preparedness of fishermen, especially for small-scale fishermen in Tasikmalaya District in facing various impacts caused by climate change. The research method used is a quantitative and qualitative survey involving in-depth interviews with 41 local fishermen, participatory observation, and secondary data analysis. The results of the study indicate that the level of preparedness of small-scale fishermen in PPI Pamayangsari Tasikmalaya District is in the ready category with an index value of 79.2%. The preparedness indicator with the highest index value is the disaster warning system at 95%, and the lowest is resource mobilization at 66%. It is hoped that there will be further analysis of the socio-economic impacts on fishing households, such as changes in livelihoods, migration, education, and changes in gender roles in response to climate change.

Keywords: Climate Change, PPI Pamayangsari, Small-scale Fishermen, Readiness

ABSTRAK

Perubahan iklim merupakan tantangan signifikan yang dapat berdampak pada berbagai sektor, termasuk pada sektor perikanan. Tantangan tersebut harus diantisipasi oleh semua stakeholder perikanan agar proses pengelolaan perikanan dapat berjalan secara berkelanjutan. Penelitian ini bertujuan untuk mengetahui tingkat kesiapsiagaan nelayan, khususnya nelayan skala kecil di Kabupaten Tasikmalaya dalam menghadapi berbagai dampak yang diakibatkan oleh adanya perubahan iklim. Metode penelitian yang digunakan adalah survei kuantitatif dan kualitatif yang melibatkan wawancara mendalam dengan nelayan setempat sebanyak 41 orang, observasi partisipatif, dan analisis data sekunder. Hasil penelitian menunjukkan bahwa tingkat kesiapsiagaan nelayan skala kecil di PPI Pamayangsari Kabupaten Tasikmalaya berada pada kategori siap dengan nilai indeks sebesar 79,2%. Indikator kesiapsiagaan dengan nilai indeks

tertinggi adalah sistem peringatan bencana sebesar 95%, dan yang terendah adalah mobilisasi sumber daya sebesar 66%. Harapannya terdapat analisis lebih lanjut mengenai dampak sosial ekonomi terhadap rumah tangga nelayan, seperti perubahan mata pencaharian, migrasi, pendidikan, dan perubahan peran gender sebagai respon terhadap perubahan iklim.

Kata kunci: Kesiapsiagaan, Nelayan, Perubahan Iklim, PPI Pamayangsari

INTRODUCTION

Climate is a measure of the average and variability of certain relevant variables such as rainfall, temperature, and wind over several months to years (Rosalia & Mulyaningsih, 2022). Climate change has become one of the significant global challenges in the 21st century. Its impacts are not only felt in the environment, but also have an impact on the social and economic lives of people, especially those who depend on primary sectors such as agriculture, plantations, and fisheries. In Indonesia, an archipelagic country with a long coastline, the fisheries sector is the main source of livelihood for millions of fishermen, especially small-scale fishermen who live on the coast (Agustian et al., 2023). If the impacts of climate change above are allowed to continue and there are no efforts to anticipate them, then slowly but surely, the damage will continue to increase and of course will have a significant impact on the balance of the aquatic ecosystem and the level of welfare of fishermen (Agustian, 2022; Agustian et al., 2023). Therefore, with the increasing impacts of climate change at local, regional, and global levels, we must continue to anticipate and implement various adaptation strategies in order to minimize further impacts that may be felt. The impacts that can be caused by climate change on water and habitat conditions, such as ecosystem stability and declining biodiversity (Keman, 2007), coral bleaching, extreme weather changes (Ainurrohmah & Sudarti, 2022; Gernowo *et al*., 2012), changes in migration patterns and fishing seasons, as well as changes in distribution and fishing areas. In addition to its impact on aspects of changes in habitat conditions, other impacts on the social and economic fields need to be taken into account (FAO, 1995). The greater the impact caused by climate change on water/habitat conditions, fish resources, social and economic conditions of fishermen, the more the level of sustainability of fishery resources will be threatened (Anwar & Wahyuni, 2019; Ariadi *et al*., 2022).

Climate change has caused changes in sea temperatures, rising sea levels, and unpredictable weather patterns. The impacts of climate change are exacerbated by environmental pollution and destruction of coastal and marine ecosystems by humans (Indrawasih, 2012; Mas'ula *et al*., 2019). These impacts not only affect the availability and distribution of fish in the waters, but also threaten the survival of fishermen and the welfare of coastal communities. This coastal area is unique because it can provide an illustration that the resources and social characteristics of the community are very diverse (Nuralam *et al*., 2023). One of the southern waters of Java Island that has the potential and diversity of fish species with economic value that is productive enough to be used as a livelihood is the area along Pamayangsari Beach which is a coastal area in Tasikmalaya Regency, West Java Province (Triyono *et al*., 2019). Located on the coast of West Java and facing directly to the Indian Ocean, PPI Pamayangsari plays an important role in providing livelihoods for thousands of fishermen and their families. However, like many other coastal areas, Pamayangsari also faces significant challenges due to climate change. Small-scale fishermen in PPI Pamayangsari are exposed to increased risks from storms, heat waves, irregular rainy seasons, and declining catches.

Weather and climate conditions in the Indian Ocean waters are closely related to the dynamics of the global atmosphere and ocean that are monitored and predicted based on the activities of natural phenomena, including ENSO, IOD, the Asian-Australian monsoon circulation, the Inter Tropical Convergence Zone (ITCZ), and the sea surface temperature of

Indonesia (Retnowati, 2011). In addition to the natural factors or phenomena above, climate change is also caused by human activities, such as pollution from industrial activities that can increase greenhouse gases, causing global warming. The many factors, both natural and human factors, that affect the weather and climate conditions of the waters in the WPPNRI 573 region show that changes can occur at any time with impacts that may not be predicted in advance. Especially in the sea or ocean waters, global climate change has caused ocean warming which causes coral bleaching, changes in storm patterns, changes in global ocean currents, and changes in precipitation.

In this context, research on the preparedness of small-scale fishermen in facing climate change becomes very important. A deep understanding of the level of preparedness, adaptation strategies implemented, and obstacles faced in the adaptation process will provide valuable insights for the development of policies and programs that can increase the resilience of fishermen to the impacts of climate change. By strengthening the preparedness of small-scale fishermen, it is expected to increase the food, economic, and social security of coastal communities, as well as support the sustainability of the fisheries sector in Pamayangsari and other coastal areas. Therefore, this study will dig deeper into the preparedness of small-scale fishermen in PPI Pamayangsari in facing climate change, as a contribution to efforts to support adaptation and mitigation of the impacts of climate change in the fisheries sector.

RESEARCH METHODS

This research method uses a structured survey with a questionnaire distributed to 40 small-scale fishermen at PPI Pamayangsari, Tasikmalaya Regency. Fishermen selected as respondents have been working for at least 2 years to ensure that they have the skills and experience in dealing with various conditions while at sea. The research was conducted between August and September 2024. Primary data was collected through direct interviews to gain an in-depth understanding of the level of preparedness, adaptation strategies implemented, and obstacles faced. The survey was conducted face-to-face to allow direct interaction with respondents and ensure data accuracy. Data analysis will be carried out using qualitative descriptive methods to identify patterns, themes, and findings that emerge from the survey results with average figures and percentages. The target indicator for the data achievement obtained is real and valid information based on the experiences of respondents, especially regarding their knowledge of climate change and the impacts it has on fishing activities, then their level of preparedness in facing climate change, as well as the strategies carried out to overcome climate change and reduce the impacts it causes.

According to LIPI-UNESCO/ISDR (2006), there are 5 indicators of disaster preparedness, 1) Knowledge and attitudes towards disaster risk, 2) Family policies or guidelines for preparedness, 3) Emergency plans, 4) Disaster warning systems, 5) Resource mobilization (Mas'ula *et al*., 2019). These five indicators are described in several questions that will be given to respondents. Data analysis in this study used index analysis. Assessment through the index is carried out to determine the level of preparedness, the index is a comparative value between one number and another. The comparative value is multiplied by 100 to make it easier. Index assessment is carried out in several assessment stages, namely: the first stage is to measure the index of each parameter. The second stage is to calculate the combined index of the parameters. The index value is in the range between 0-100, so the higher the index value, the higher the level of preparedness. Index assessment is carried out using the following formula:

$$Indeks = \frac{Total\ real\ score\ parameters}{Maximum\ score\ of\ the\ parameter}\ x\ 100$$

Then, to determine the preparedness index and its categorization, it is classified as follows.:

Table 1. Readiness Index

No.	Index Value	Category
1	80-100	Very ready
2	65-79	Ready
3	55-64	Almost ready
4	40-54	Not ready
5	< 40 (0-39)	Not ready

Source: (Mas'ula *et al*., 2019)

RESULT

This study evaluates the preparedness of small-scale fishermen in facing climate change in PPI Pamayangsari using several main indicators: knowledge and attitude towards disaster risk, preparedness policy, emergency plan, disaster warning system, and resource mobilization. Each indicator shows varying levels of preparedness, which illustrates the strengths and weaknesses in the adaptation strategies of the local fishing community. The respondents in this study were all small-scale fishermen who carry out fishing activities in PPI Pamayangsari, Sindangkerta Village, Cipatujah District, Tasikmalaya Regency. Based on the results of interviews in the field, these fishermen have an age range between 22 to 56 years with work experience as fishermen between 6 months to 31 years.

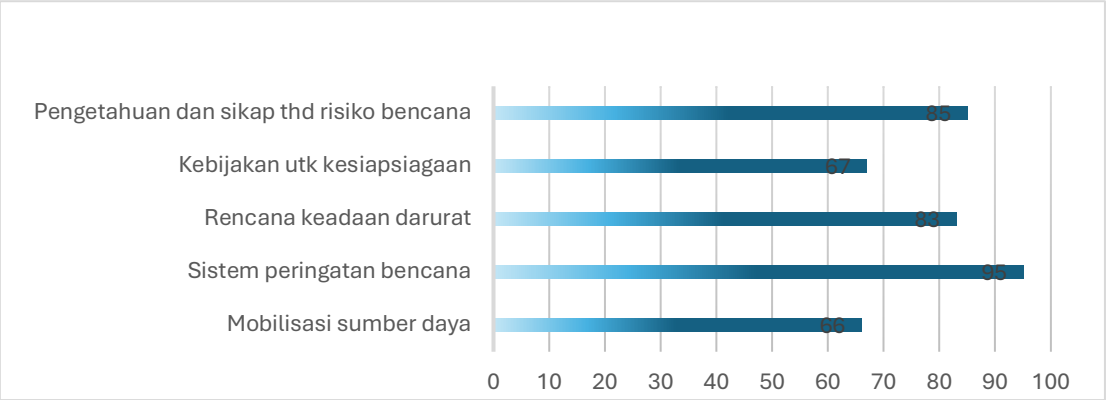

Figure 1. Percentage of Fishermen's Readiness at PPI Pamayangsari

Based on Figure 1, there are 5 indicators measured, namely knowledge and attitudes towards disaster risk, preparedness policies, emergency plans, disaster warning systems, and resource mobilization. Of the five indicators, the disaster warning system indicator received the highest preparedness score, which was 95% and the indicator with the lowest level of preparedness was resource mobilization at 66%. So, when averaged, all of the preparedness indicators received a score of 79.2% which is included in the ready category.

DISCUSSION

3.1 Knowledge and Attitude Indicators towards Disaster Risk

The results of the study showed that the level of knowledge and attitudes of fishermen towards disaster risks was quite high, namely 85%. This reflects that the majority of fishermen in PPI Pamayangsari have a good understanding of climate change and its potential impacts on their fishing activities. This knowledge includes an understanding of extreme weather, rising sea levels, changes in fishing patterns, and potential economic losses due to changes in the

marine environment. Factors that contribute to this high level of knowledge include counseling carried out by the government or non-governmental organizations (NGOs), as well as fishermen's direct experience in dealing with extreme weather and observing changes in fishing patterns (Rais *et al*., 2024). In addition, fishermen's positive attitudes towards the importance of preparedness are also key. They realize that the right understanding and attitude towards disaster risks can reduce the losses incurred. However, even though the level of knowledge and attitudes is quite high, the application of this knowledge in the form of real actions to improve preparedness is often still limited. This is due to several factors, such as limited economic resources, limited access to adaptation technology, and high dependence on traditional practices that are not always adaptive to climate change.

3.2 Policy Indicators for Preparedness

Furthermore, the level of preparedness based on policy is at 67%, indicating that there are several supportive policies, but their implementation is still not optimal. The policies referred to here include government regulations related to disaster management, technical assistance for fishermen, and the provision of supporting infrastructure such as safe harbors and early warning systems. Fishermen at PPI Pamayangsari seem to feel the existence of policies aimed at improving their preparedness. However, the main obstacle faced is the uneven implementation of policies that are often poorly targeted. For example, fishermen complain that the assistance provided is more short-term, such as direct cash assistance after a disaster, rather than long-term investment in the form of training or equipment that is more resistant to climate change. In fact, according to Zunnuraeni *et al*., (2024), policies or regulations related to climate change mitigation in Indonesia still focus on activities on land so that they do not include the sea as one of the sectors of the Greenhouse Gas Emission Reduction Action Plan (RAN-GRK). In addition, existing policies often do not involve active participation of fishermen in the planning and decision-making process. This top-down approach makes policies less effective because they do not match the local needs and conditions of fishermen. Therefore, to increase the effectiveness of preparedness policies, it is important to adopt a more inclusive and community-based approach.

3.3 Emergency Plan Indicators

Emergency plan indicators show a preparedness rate of 83%, indicating that most fishermen in PPI Pamayangsari have been aware of the importance of emergency planning. This includes knowledge of evacuation procedures, identification of safe places, and organizing communities to deal with disasters such as storms or high waves. A good emergency plan is one of the determining factors of preparedness, because it can minimize the impact of disasters on the safety of lives and property. The involvement of the fishing community in simulation exercises and the development of evacuation plans also helps to improve their preparedness. However, the effectiveness of emergency plans can still be improved through the provision of more comprehensive information and more frequent routine training.

3.4 Disaster Warning System Indicator

The disaster warning system indicator achieved the highest level of preparedness with a figure of 95%. This shows that fishermen in PPI Pamayangsari have good access to weather information and early warning systems. This system includes radio-based information technology, short messages, and weather applications that provide early warnings of bad weather conditions or climate change. The availability and effectiveness of this early warning system are very important because they allow fishermen to make quick and appropriate decisions, such as postponing departure or immediately returning to port when weather conditions worsen. Increasing access to fast and timely information can save lives and reduce

economic losses (Herawati *et al*., 2023). However, although the early warning system is quite effective, the main challenge is ensuring that all fishermen, including those in remote areas or with limited communication access, receive this information in a timely manner. Additional training on how to interpret weather information and respond to early warnings also needs to be improved to ensure that fishermen not only receive information but are also able to act on it.

3.5 Resource Mobilization Indicators

Finally, the resource mobilization indicator shows a preparedness figure of 66%, which is relatively lower compared to other indicators. This reflects that the capacity of fishermen to mobilize resources, whether in the form of manpower, equipment, or finance, is still limited in dealing with climate change and disasters. Effective resource mobilization is essential for preparedness, as it allows fishermen to take adaptive actions, such as repairing or replacing damaged equipment, modifying boats to cope with extreme weather conditions, or accessing alternative markets when fisheries are disrupted. However, economic constraints, limited access to credit, and insurance are major barriers to resource mobilization. Fishermen often rely on social networks and community support to mobilize the resources they need (Helmi & Satria, 2012). However, without adequate policy support, these resource limitations can exacerbate fishermen's vulnerability to climate change. Therefore, collaborative efforts are needed between the government, NGOs, and communities to provide better access to resources and financial support.

CONCLUSION

The level of preparedness of small fishermen in PPI Pamayangsari in facing climate change is included in the ready category with an index value of 79.2%. The highest level of preparedness is in the disaster warning system indicator (95%) and the lowest is in the resource mobilization indicator (66%). The recommendation is that further analysis should be carried out regarding the socio-economic impacts on fishermen's households, such as changes in livelihoods, migration, education, and changes in gender roles as a response to climate change.

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