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Natuna Fisheries Resources: DPSIR Framework

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Abstract

Natuna Waters have a high potential for fishery resources, including fish, shrimp, and other marine products. However, the potential faces serious problems, such as overfishing, illegal fishing, and conflict between local fishermen and high-tech foreign fishermen. In this paper, we apply the DPSIR (Driving forces, Pressures, State, Impact, and Response) framework to analyze the potential and problems of Natuna fisheries resources. We identified the driving and pressure factors affecting the condition of the waters, as well as the resulting impacts. We also discuss the responses that have been and are being made to address the issue. The results of the analysis showed that Natuna waters are under great pressure from human activities, especially overfishing and illegal fishing, which harm the sustainability of fishing resources in Natuna. This paper contributes to the understanding of the potential and problems of marine resources of Natuna waters, as well as informing policymakers about the policies that need to be taken to maintain the sustainability of marine resources (especially fisheries) in the region.

Keywords *DPSIR, natuna, marine, fisheries, resources*

INTRODUCTION

Natuna Waters is a marine area in Indonesia that has a high potential for marine resources. The region is famous for its abundance of fish, shrimp, and other marine products. However, the region is also faced with serious problems, such as overfishing, habitat destruction, and conflicts between traditional fishermen and commercial fishermen. Natuna waters are in a very strategic position in terms of economy, defense, and security, as well as politics for Indonesia, because of its position that is located in the North Natuna Sea area and international shipping lanes (Fauzan et al., 2019). The potential of abundant Natuna Sea Natural Resources is an attraction for some countries to use it, so there is often illegal fishing and violation of territorial boundaries (Putranto et al., 2020).

Natuna waters are part of WPP-RI 711 (waters of the Karimata Strait, Natuna Sea, and South China Sea) which has a sustainable potential of 767,126 tons per year. Specifically for the Natuna Sea, the potential of fish resources is 383,563 tons per year, or about 50% of the potential of WPP 711. The amount of catch allowed is 80% of the sustainable potential or about 306,850 tons per year. Capture fisheries dominate both in terms of production and the number of business households compared to aquaculture. The total production of capture fisheries in 2021 reached 132,632.65 tons. The dominant type of fish is tuna, which includes Auxis thazard, Euthynurus affinis, and Thunnus tonggol (KKP, 2021).

Based on sectoral contribution to GRDP, the fisheries sector in Natuna Regency contributed 13.34%. The potential of large fish resources encourages people in Natuna waters to depend on life as fishermen. There are about 6,130 households in Natuna Regency whose lives depend on businesses in the fisheries sector, both fishing and aquaculture (BPS, 2022). In this paper, we will apply the DPSIR (Driving forces, Pressures, State, Impact, and Response) framework to analyze the potential and problems of Natuna's fisheries resources.

METHOD

We use the DPSIR framework to analyze data and information coming from various secondary sources. This approach involves the analysis of driving and pressure factors that affect the condition of the waters, as well as the resulting impact. We also discussed the response that governments and communities have been and are taking to address the problem.

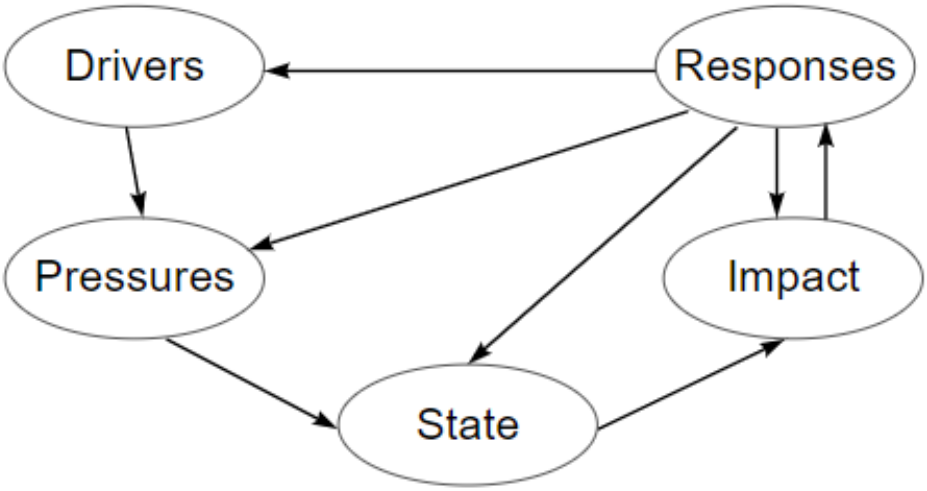

Figure 1. DPSIR Framework

The DPSIR framework assumes cause-and-effect relationships between the interacting components of social, economic, and environmental systems. The DPSIR framework was first developed by the European Environmental Agency/EAA in 1999. The DPSIR framework helps decision-makers or communities understand that environmental, socio-economic, and other issues are interrelated. This framework/ model illustrates that socio-economic activities (driving force) put pressure on the environment, affect the quality and quantity of the environment and Natural Resources (state), and cause an impact (impact) on humans. Then the government and society respond to changes that occur through environmental, economic and sectoral policies and changes in awareness and behavior (response).

RESULTS AND DISCUSSION

The results of our analysis using the DPSIR framework on Natuna fisheries resources can be seen in the following figure.

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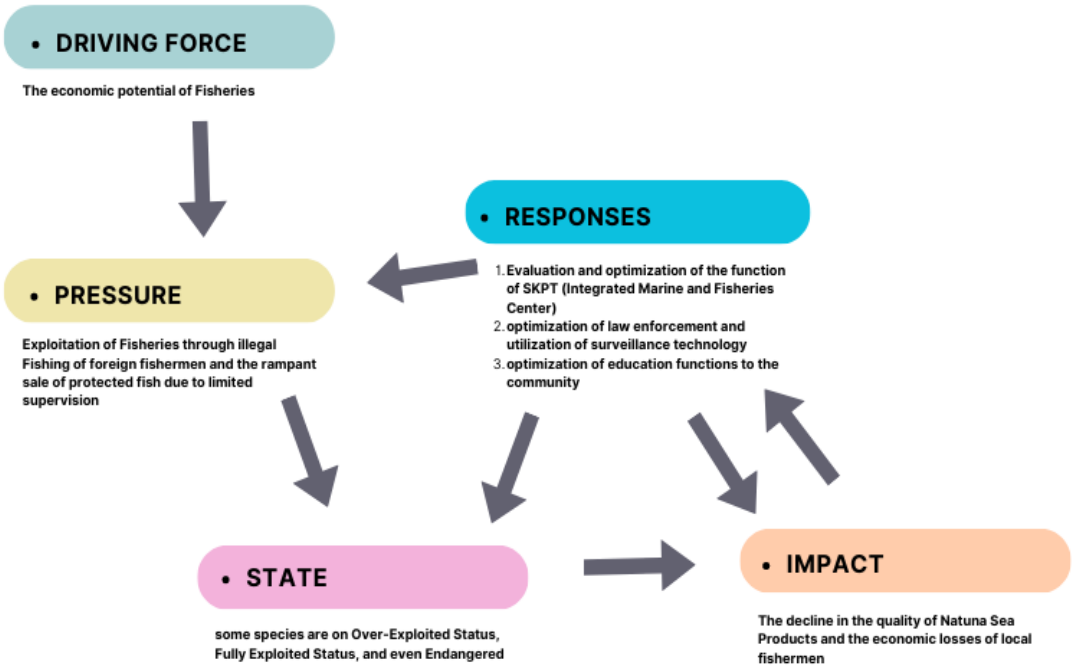

Figure 2. DPSIR Analysis of Natuna Fisheries Resources

Driving Force

The economic potential of fisheries, where global market demand for fish and other marine products has increased dramatically in recent years. Based on a report by the Organization for Economic Cooperation and Development (OECD), global fish consumption was 180.07 million metric tons in 2021, an increase of 1.02% compared to the average consumption in 2018-2020 which was 178.3 million metric tons. By 2030, fish consumption is projected to rise to 200.6 million metric tons of marine resources (especially fisheries) in the region. This has encouraged increased fishing activity in Natuna waters, supported by modern vessel technology and machinery has enabled more efficient and faster fishing.

Pressures

The exploitation of Fisheries through illegal Fishing of foreign fishermen and the rampant sale of protected fish due to limited supervision. Abundant fisheries potential, resulting in a lot of illegal fishing from neighboring countries into the waters of Natuna, causing prolonged conflict between countries. In addition, there are restricted species such as Napoleon fish (Cheilinus undulatus) which are still traded illegally by the community.

State

Small pelagic fish species, reef fish, crab, and squid are on over-exploited status; large pelagic fish, demersal fish, penaeid shrimp, and lobster are on fully exploited status (Zulham et.al, 2017); as well as fish species that have protected status become endangered such as napoleon fish (Indrawati and Suparmo, 2021).

Impact

The decline in the quality of Natuna sea products and the economic losses of local fishermen because they are unable to compete with illegal foreign fishermen with large-tonnage ships and more sophisticated technology that is even escorted by those countries' coast guards.

Responses

Evaluation and optimization of the function of SKPT (Integrated Marine and Fisheries Center) (Nurani et.al, 2020), where SKPT is expected to contribute economically, especially for local fishermen; optimization of law enforcement and utilization of surveillance technology using the latest technology such as VMS, Radarsat, GIS (Fadilah et.al, 2020); and optimization of education functions to the community, especially by the Ministry of Maritime Affairs and Fisheries.

Another issue and potential on Natuna's marine resources

In addition to the socio-ecological analysis using the DPSIR framework that has been discussed previously, there are also potential issues regarding natuna marine resources:

1) **The potential of oil and gas reserves,** especially natural gas in block d alpha (East Natuna Sea) is the largest in Indonesia and one of the largest in the world; however, the status is still on exploration because the current technology is not sufficient to carry out massive exploitation and production due to the content of impurities in the form of CO2 (*carbon dioxide*) is very high (72%); the government needs to accelerate cooperation on oil and gas utilization in block d alpha with potential consulting companies / potential contractors, it can also be discussed with various parties including academics and experts from various institutions to find the right technology to be used for exploitation.
2) **Issues of national sovereignty**, besides illegal fishing, there are other illegal activities, such as the intrusion of foreign ships from Malaysia, Vietnam, and China. Even a Chinese-flagged research vessel was detected to be engaged in activities in the North Natuna Sea that threaten the country's sovereignty (IOJI, 2021). Border conflicts such as the unilateral claim of China's borders by the nine-dash line, while the Indonesian side is based on the EEZ under the ratification of UNCLOS 1982.

Figure 3. China's nine-dash line
Source: Berlianto (2020)

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In addition to strengthening the fleet, optimizing law enforcement, and strengthening surveillance technology, strengthening through maritime diplomacy both at home and abroad, through forums and regional meetings of ASEAN, Asia, and international such as HACGAM (Head of Asian Coast Guard Agency Meeting), MSDE (Maritime Security Desktop Exercise), IQRA (Indian Ocean Rim Association), IMO (International Maritime Organization) also needs to be done as an option to address the issue of state sovereignty.

CONCLUSION

Natuna Waters are rich with potential marine resources, both biotic and abiotic resources. Fishery resources are one of the assets owned by Natuna waters that can have an economic impact on the community. Unfortunately, illegal fishing activities are still rife in Natuna waters, so domestic fishermen have to compete with foreign vessels. Natuna waters also have the potential for oil, mineral, and natural gas resources that can increase Indonesia's oil and gas reserves. The various potential marine resources owned by Natuna are then one of the triggers for the emergence of sovereignty issues between Indonesia and neighboring countries that border directly with Natuna.

SUGGESTIONS

Based on the results mentioned above, to respond to the pressure, state, and impact that occur, the government and society should do the evaluation and optimize the function of the Integrated Marine and Fisheries Center, optimizing law enforcement through the utilization of surveillance technology, and strengthening maritime diplomacy through regional and international forums.

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