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Research Article

An Analysis of Destructive Fishing as an Anthropogenic Disaster in Coastal Areas: A Maritime Security Perspective

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Abstract

Destructive fishing has emerged as a critical threat to maritime ecosystems, posing severe risks to the economy, ecosystem sustainability, resource management, and national security, along with its complex cross-sectoral impacts in coastal areas. As a form of illegal fishing, its harmful consequences necessitate comprehensive scrutiny. This research aims to categorize destructive fishing as an anthropogenic disaster from a maritime security perspective, emphasizing its broad cross-sectoral effects. Employing a qualitative methodology alongside an extensive literature review, this study integrates disaster and maritime security theories, supported by relevant case studies, to thoroughly investigate the issue. The findings reveal that destructive fishing practices qualify as non-natural or anthropogenic disasters, with impacts directly stemming from human activities. These practices damage marine resource ecosystems, disrupt economies, compromise human security, and threaten national security in coastal regions. The study concludes that destructive fishing constitutes an anthropogenic disaster, demanding an urgent, coordinated response from multiple stakeholders. This research advocates for the development and implementation of policies that address the technical dimensions of maritime security, integrate disaster management strategies, and incorporate anthropological insights. Such policies are essential for devising and executing sustainable solutions to this pervasive issue on a global scale.

Keywords: Destructive Fishing, Anthropogenic, Disasters, Coastal Areas

INTRODUCTION

In general, maritime security threats are problems that frequently occur in marine waters. These can include acts of lawlessness that affect marine ecosystems and impact the people who depend on them. At a joint event with the EU Commission and participants of the Seminar on EU Hygiene Regulations for Fisheries Product Imported to EU at Discovery in Bali, Susi Pudjiastuti (then Minister of Marine Affairs and Fisheries of the 2014-2019 Working Cabinet) explicitly identified illegal fishing as a "national disaster". This was due to the significant state losses and environmental problems caused by this activity (Detik, 2015). The government and related stakeholders have focused their attention on illegal fishing activities in general, such as fish theft by foreign vessels, violations of Indonesia's Exclusive Economic Zone (EEZ) borders, and other violations. But

it is very limited in highlighting internal problems at the local scale, especially in coastal areas. While in fact, there are illegal fishing practices that have a large and detrimental impact, one of which is destructive fishing.

Destructive fishing is defined as the practice of fishing using materials, tools, or methods that damage fish resources and the environment. These include the use of explosives (dynamite fishing), toxic materials (cyanide fishing), stun (electro fishing), and other types of fishing gear that are not environmentally friendly (Sugiono et al., 2022; Willer et al., 2022). These practices result in interconnected cross-sectoral impacts, including the degradation of marine ecosystems, the threatened livelihoods of coastal communities who depend on marine products for their livelihoods, and the experience of decreased income and increased operational costs due to increasingly distant fishing areas. The local economy is also affected by the increase in consumer fish prices due to decreased supply (Lestari et al., 2020).

In terms of human security, fish stock shortages affect a large proportion of Indonesia's population, who rely on fish as their main source of protein and increase food insecurity. The use of substances such as cyanide and fish bombs in fishing also poses a risk of poisoning and fatal accidents (Maser et al., 2023). On a macro level, destructive fishing practices have the potential to impact national security by negatively affecting economies, ecosystems and resource security (Nauen & Boschetti, 2022; Dao, 2023). Limited surveillance, low levels of public awareness and economic pressures (poverty) have been identified as key drivers of destructive fishing practices (Willer et al., 2022), with a particularly high prevalence observed in coastal areas and small islands.

The coastal areas and their natural resources have the potential to play a pivotal role in Indonesia's economic development, serving as one of the pillars of the national economy (Prasetyo, 2023). Coastal areas, which comprise both marine and terrestrial environments, are frequently susceptible to a range of natural and anthropogenic hazards (Haran, 2020). Coastal areas present a multitude of opportunities for the development of various activities within the fisheries sector. Nevertheless, coastal communities, which are those who actively utilise marine and fisheries resources, are frequently the subject of criticism for failing to pay sufficient attention to the conservation of fisheries resources. This is due to the utilisation of environmentally unfriendly and destructive fishing practices (Pinto et al., 2022). At a macro level, this practice would constitute a significant threat to national security.

In accordance with the stipulations of Law No. 24/2007 on Disaster Management, a disaster is defined as an event or series of events that endanger and disrupt the lives and livelihoods of individuals, caused by natural and/or non-natural factors, as well as human factors. Such events may result in human casualties, environmental damage, property losses, and psychological impacts. In light of this definition, it is crucial to conduct a study to classify the destructive impacts of fishing as a man-made (anthropogenic) disaster. This classification offers a novel perspective on destructive fishing practices, thereby facilitating the development of policies designed to mitigate their adverse effects.

Previous studies have highlighted several key findings. Silva et al. (2019) noted that destructive fishing in coastal areas increases vulnerability due to its contribution to the degradation of marine ecosystems, sustainability, and the well-being of coastal communities. Willer et al. (2022) pointed out the lack of a consensus definition for 'destructive fishing,' complicating efforts to address these practices globally. Williams et al. (2022) explained that destructive fishing exerts significant pressure on global coastal regions, impacting biodiversity and sustainability, with various destructive fishing practices contributing to high anthropogenic pressure. However, the literature still lacks comprehensive integration of these impacts within the frameworks of maritime security and disaster management. The existing studies are segmented, focusing on definitions, impacts, and mitigation measures without a holistic approach. There is no research specifically discussing destructive fishing as an anthropogenic disaster in a broader coastal context, which this study aims to address.

Considering this gap, the research aims to answer the following questions: How can destructive fishing practices be categorized as anthropogenic disasters within the maritime security framework? What are the implications of this categorization for maritime resource management and policy? This study seeks to analyze how destructive fishing can be categorized as an anthropogenic disaster in coastal areas through a maritime security perspective, necessitating a serious and optimized response. The increasing incidence of destructive fishing is not only an environmental issue but also a security concern, with far-reaching implications for economic and social stability in coastal areas. These practices exacerbate ecological vulnerabilities, harm biodiversity, and reduce the capacity of local communities to sustainably manage natural resources. Despite the broad impact, few studies bridge the direct ecological effects with the more complex issues of maritime security and disaster management.

This study underscores the urgent need for effective policy frameworks that integrate marine resource management strategies, maritime security, and disaster response. Hence, the research is not only academically relevant but also practically significant, with the potential to guide more effective policymaking and enhance inter-sectoral coordination. By focusing on the categorization of destructive fishing as an anthropogenic disaster within the maritime security context, this research offers crucial insights that can strengthen the scientific basis for sustainable management policies and disaster response strategies. This will help mitigate future risks and support the long-term sustainability of coastal communities dependent on marine resources.

METHOD AND THEORY

This research employs a qualitative approach, comprising a literature study. The objective of this study is to interpret and describe existing data in accordance with the current situation. The research design is also descriptive, whereby the object under study is explained in accordance with the situation and conditions at the time of the research (Sugiono, 2020). This approach enables the provision of a comprehensive description, thereby facilitating the attainment of the research objectives. This research design

employs a content analysis of existing literature to identify, analyse and synthesise information pertaining to the impacts of destructive fishing, which can be categorised as anthropogenic disasters in coastal areas. The data collection process was conducted through a literature study to gather theories and concepts from various sources, including books, government regulations, journals, and other relevant scientific publications (Dzogovic & Bajrami, 2023). The data was then subjected to a rigorous analysis, integrating the theories of disaster (Oliver-Smith & Hoffman, 2019), maritime security (Bueger, 2015) and related research outcomes and case studies. This served as the rationale and discussion in the research.

The concept of maritime security, in this study, is explored as a multidimensional framework encompassing issues such as territorial sovereignty, resource security, environmental protection, and human security in coastal and maritime areas. Maritime security is defined as the condition in which maritime activities are protected from threats or risks that may disrupt their sustainable utilization (Bueger, 2015). Within this framework, destructive fishing—practices that harm marine ecosystems, such as blast fishing and cyanide fishing—can be viewed as a threat not only to environmental sustainability but also to broader human security in coastal communities.

The term "anthropogenic disaster" refers to events caused by human activities that result in significant environmental, economic, or social impacts. According to Oliver-Smith and Hoffman (2019) in The Angry Earth: Disaster in Anthropological Perspective, anthropogenic disasters are distinguished by their human-induced origins, which exacerbate vulnerabilities in social and environmental systems. Key criteria of anthropogenic disasters include the direct involvement of human actions in the cause of the disaster, their role in increasing exposure to risks, and the cascading effects on ecosystems and livelihoods. Destructive fishing meets these criteria as it directly results from human activity, significantly disrupts marine biodiversity, and undermines the livelihoods of coastal populations reliant on healthy ecosystems. By integrating the theories, the results of literature studies and related case studies, the research is expected to present a comprehensive analysis and provide recommendations that can be used by stakeholders to improve the effectiveness of performance in maritime security and man-made disaster management.

RESULT AND ANALYSIS

Vulnerability of Coastal Areas

Coastal areas, as defined in Law No. 1/2014 on the Amendment to Law No. 27/2007 on the Management of Coastal Areas and Small Islands, are transitional areas between land and marine ecosystems. These zones are directly influenced by both terrestrial and marine environmental changes. Coastal areas and small islands are regulated as areas extending from land, encompassing the administrative boundaries of sub-districts, to the sea at a distance of 12 miles, in line with the jurisdictional limits of a country (Tenri et al., 2022). The coastal zone, being a dynamic and highly productive interface between land and sea, plays an essential role in supporting a variety of ecosystems that are critical for

maintaining the health and sustainability of both marine and terrestrial life. These regions host distinctive features such as mangrove forests, coral reefs, wetlands, and sandy shores, which provide a wealth of natural resources, making them areas of high ecological and economic value.

Coastal ecosystems, influenced by natural processes such as tides, winds, and currents, face a range of human-induced pressures. As a transition zone, coastal areas are home to diverse species, offering habitats for numerous marine organisms while providing essential ecosystem services, such as water filtration, coastal protection, and biodiversity support. Additionally, coastal areas serve as critical sources of livelihood for human communities, particularly in regions with extensive coastlines like Indonesia. Numerous studies emphasize the vital role of coastal areas in ensuring food security and economic stability, especially in countries with significant maritime boundaries (Hasriyanti et al., 2023; Liu et al., 2021).

The geomorphology of coastal zones, encompassing river deltas, lowlands, beaches, mangrove forests, coral reefs, lagoons, and sand dunes, determines the nature of ecological interactions between terrestrial and marine environments. These interactions foster complex systems that sustain biodiversity and ecosystem services. However, these regions' dynamic nature also exposes them to heightened vulnerability due to the interplay of natural forces and anthropogenic pressures. Changes in climate, human activities, and other anthropogenic factors destabilize these fragile environments (Pertami et al., 2022). The vulnerability of coastal ecosystems and the human populations dependent on them is a subject of growing concern, as these regions are increasingly threatened by both natural and human-made disasters (Lacava & Ciancia, 2020).

Natural disasters such as tsunamis, earthquakes, tropical storms, and tidal flooding are frequent threats to coastal areas (Haran, 2020). Rising sea levels, driven by climate change, exacerbate these threats by inundating low-lying areas and accelerating coastal erosion. Coastal reclamation activities, often aimed at expanding land for human settlement or development, further compound these risks by disrupting natural processes and reducing the resilience of coastal ecosystems. Coastal erosion has become a significant issue, leading to the loss of vital land and habitats. Additionally, marine and terrestrial pollution from industrial discharges, agricultural runoff, and urban settlements has degraded coastal ecosystems, intensifying pressures on these regions (Arifin & Taqyuddin, 2023). Over time, these cumulative impacts weaken the ability of coastal ecosystems to recover and adapt to changing conditions.

Climate change has introduced new challenges for coastal regions, with extreme weather events, sea-level rise, and ocean acidification further destabilizing marine and terrestrial environments. The degradation of coastal ecosystems due to climate-induced stressors and human exploitation has far-reaching implications for local communities, undermining their resilience and adaptive capacity. Takagi and Heidarzadeh (2023) emphasize that these changes threaten the socio-economic stability of coastal areas by reducing the availability of marine resources, which are critical for livelihoods and food security.

Human activities, particularly unsustainable resource exploitation, exacerbate the vulnerability of coastal areas. Overfishing, illegal fishing, and destructive practices such as dynamite and cyanide fishing are among the most significant contributors to environmental degradation in these regions. These activities not only lead to the depletion of fish stocks but also disrupt the ecological balance of coastal ecosystems. For example, coral reefs, which support approximately 25% of marine fish species, are highly sensitive to destructive fishing methods. The loss of these ecosystems results in reduced biodiversity, weakened ecosystem services, and diminished fishery productivity.

Coastal reclamation and urban development further strain coastal environments. The conversion of mangroves and wetlands for agricultural, industrial, or residential purposes leads to habitat loss and decreased natural protection against coastal hazards. Pollution from these activities exacerbates the degradation of water quality, affecting marine organisms and human communities alike. Arifin and Taqyuddin (2023) highlight that industrial discharges, agricultural runoff, and plastic pollution are major contributors to the declining health of coastal ecosystems, reducing their capacity to provide critical services.

Coastal areas are home to communities whose livelihoods are closely tied to marine resources. These communities are particularly vulnerable to the consequences of environmental degradation and resource depletion. Small-scale fisheries, which provide income and food security for millions, are increasingly threatened by overfishing and habitat loss. Rahmat and Neilson (2023) observe that the integration of small-scale fisheries into global markets has introduced new challenges, such as increased competition and resource depletion, further marginalizing traditional fishers. The socio-economic impacts of coastal vulnerability extend beyond resource depletion. Rising sea levels and extreme weather events displace communities, leading to loss of homes, infrastructure, and cultural heritage. Economic inequalities within coastal communities exacerbate these challenges, as marginalized groups often lack access to resources and opportunities for adaptation. Environmental degradation further deepens these disparities, pushing vulnerable populations into precarious conditions (Rizal & Ana, 2019).

The economic costs of coastal degradation are not limited to immediate losses in fish stocks or natural habitats but extend to broader disruptions in regional and national economies. Tourism, a significant revenue source in many coastal areas, suffers when environmental degradation reduces the attractiveness of natural destinations. For example, coral reefs, which are among the most popular tourist attractions, lose their value as ecosystems are damaged by overfishing and pollution. The resulting decline in tourism revenues exacerbates the economic vulnerability of coastal communities, which often lack alternative sources of income.

Numerous case studies illustrate the complex interactions between environmental degradation, resource depletion, and community resilience. In the Marine Protected Area (MPA) of the Anambas Archipelago, research shows that fishers and fish farmers are particularly vulnerable due to their heavy dependence on coastal resources. Destructive

fishing practices, such as blast and cyanide fishing, not only affect fish stocks but also degrade the ecosystems that fishers rely on for their livelihoods (Albasri & Sammut, 2021). Similarly, settlements on Barrang Lompo Island face catastrophic abrasion, worsened by vegetation decline and overfishing, highlighting the physical and economic impacts of environmental degradation on coastal communities (Amalia & Nur, 2023).

In South Sulawesi, illegal fishing practices have caused widespread damage to coral reefs and significantly reduced fish populations. These practices disrupt local communities' ability to sustain traditional livelihoods, leading to conflicts between traditional fishers and industrial operations competing for diminishing resources (Thamsi et al., 2024; Dao et al., 2024). Lampung Bay presents another example, where the degradation of coral reefs due to destructive fishing has caused significant economic losses for local fishers. Declining fish stocks and reduced ecosystem services directly impact livelihoods, underscoring the interconnected nature of environmental and socio-economic challenges (Sinurat et al., 2024; Kautsari et al., 2024). Further analysis in regions such as North and South Java highlights the compounded effects of climate change and destructive fishing practices. Studies reveal that socio-economic vulnerabilities in these areas are often linked to limited access to resources and insufficient governmental support. Efforts to mitigate these impacts require targeted interventions that address both the environmental and social dimensions of coastal vulnerability (Handiani et al., 2021).

To address the multifaceted challenges faced by coastal areas, comprehensive and sustainable management strategies are essential. Models such as the Environmental Sensitivity Index (ESI) have been used to assess the vulnerability of coastal ecosystems to pollution and destructive fishing activities. For instance, studies in South Sumatra highlight the sensitivity of coastal ecosystems and the importance of targeted interventions to protect these areas from further degradation (Rustandi et al., 2020). These models provide valuable insights into prioritizing conservation efforts and allocating resources effectively. Integrated approaches that combine environmental protection with socio-economic development are critical for enhancing the resilience of coastal communities. Handiani et al. (2021) argue that addressing coastal vulnerability requires collaboration across sectors, including government agencies, non-governmental organizations, and local communities. Efforts to promote sustainable fishing practices, restore degraded ecosystems, and strengthen regulatory frameworks are vital for safeguarding coastal areas.

International cooperation also plays a key role in addressing the global nature of coastal challenges. The recognition of coastal vulnerability in disaster-prone countries, such as Indonesia, has been a significant agenda in international forums. Emphasizing local capacity building and knowledge exchange can empower communities to better manage risks and adapt to changing conditions (Perwita et al., 2022). Local initiatives, such as community-based resource management programs, have shown promise in addressing the challenges faced by coastal areas. These programs prioritize the active involvement of local populations in conservation efforts, fostering a sense of ownership and accountability. For example, the implementation of marine spatial planning initiatives in Indonesia has demonstrated the potential to balance ecological preservation

with economic development. By aligning conservation goals with local needs, these initiatives provide a sustainable pathway for managing coastal resources.

Coastal areas, as dynamic interfaces between land and sea, are vital for supporting biodiversity, providing ecosystem services, and sustaining human livelihoods. However, these regions face increasing threats from natural disasters, climate change, and human activities. The vulnerability of coastal ecosystems and communities underscores the need for integrated management approaches that address environmental, socio-economic, and governance challenges. By prioritizing sustainable practices and fostering collaboration at local, national, and international levels, it is possible to enhance the resilience of coastal areas and ensure their long-term sustainability. The interplay of natural and human-induced factors necessitates a holistic strategy to protect these critical zones, ensuring their ecological and socio-economic functions for future generations.

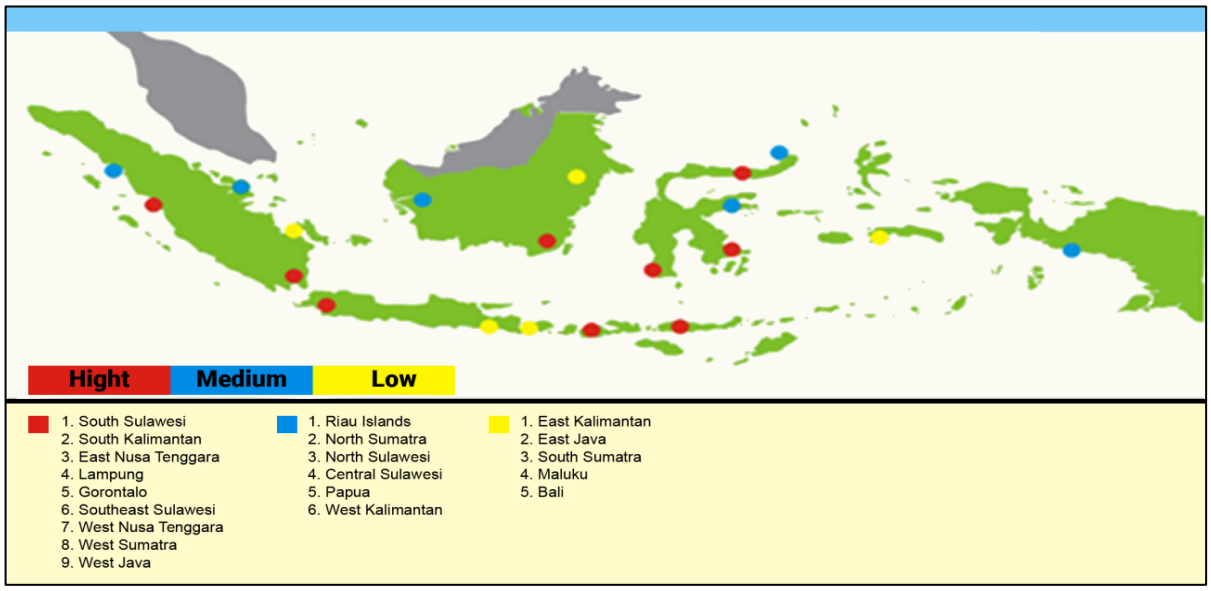
Destructive Fishing from a Maritime Security Perspective

In the context of marine and fisheries resource management, destructive fishing represents one of the most pressing threats to the sustainability of Indonesia's fisheries potential. Destructive fishing refers to any fishing activity that employs tools, materials, or methods that not only target fish populations but also harm the broader marine environment. Practices such as the use of explosives (commonly referred to as dynamite fishing), toxic substances (e.g., cyanide fishing), electro-fishing (stun fishing), and other unsustainable methods fail to meet environmentally friendly standards (Sugiono et al., 2022; Matondang et al., 2023). These activities are particularly destructive due to their dual impact: immediate losses in fish populations and long-term environmental degradation. Coral reefs, marine biodiversity, and ecosystem health are among the most affected. Recognizing the gravity of this issue, the Indonesian government, through the Ministry of Maritime Affairs and Fisheries (MMAF), enacted Decree No. 114/2019 on the National Action Plan for Monitoring and Combating Destructive Fishing Activities (2019–2023). This initiative underscores the serious threat destructive fishing poses to the sustainability of marine resources and the livelihoods of millions of Indonesians who depend on them.

An illustrative example of the damage caused by destructive fishing can be found in South Nias Regency within the Batu Islands area of Indonesia. According to the Coral Reef Information and Training Centers (CRITC, 2006), the region is home to 3,728 hectares of coral reefs, of which over 72% have been severely degraded, with only 5% remaining in excellent condition. This degradation is largely attributable to destructive fishing practices, including dynamite fishing, the use of poisonous chemicals, and trawling. These methods not only devastate coral reef ecosystems but also deplete fish populations, jeopardizing the long-term viability of fisheries in the region (Sugiono et al., 2022). Data from the MMAF between 2013 and 2019 indicates that fisheries supervisors, in collaboration with local agencies, addressed 653 cases of destructive fishing across Indonesia. The highest number of incidents occurred in South Sulawesi, with 471 cases involving explosives and toxic materials. Other provinces, such as South Kalimantan and

Lampung, also reported significant incidents, with 57 and 30 cases, respectively, involving stun fishing.

Figure 1 Map of destructive fishing hotspots in Indonesia



Sumber: KKP, 2019

The environmental consequences of destructive fishing are severe and far-reaching. Coral reefs, which serve as critical habitats for diverse marine species, are particularly vulnerable. The World Bank (1996) reported that a single detonation of a 2000-gram bomb can obliterate up to 12.56 square meters of coral reef. This destruction has cascading effects on marine biodiversity. Coral reefs are not only home to countless species but also play a vital role in maintaining ecological balance by providing shelter, breeding grounds, and feeding areas for marine organisms. Damage to these ecosystems disrupts food chains, leading to reduced productivity in local fisheries.

The use of cyanide, especially for ornamental fish capture, exacerbates these problems. Cyanide poisons target fish by stunning them, making capture easier, but the chemicals also spread through water currents, killing non-target species, damaging coral polyps, and disrupting marine plants. Over time, this leads to the collapse of ecosystems that are critical for sustaining marine biodiversity. Poisoned coral reefs lose their resilience, making it difficult for them to recover from natural or human-induced stressors. The spread of toxins poses an additional threat to marine organisms, with some species facing the risk of extinction due to habitat destruction and pollution. Moreover, electro-fishing methods generate shock waves that indiscriminately kill or injure fish, including juveniles, further depleting fish populations and hindering their ability to regenerate.

In addition to ecosystem damage, destructive fishing practices contribute to broader environmental degradation. Coral reefs act as natural barriers, protecting coastlines from erosion and storms. Their destruction increases coastal vulnerability to natural disasters, endangering both human settlements and economic infrastructure. The loss of marine biodiversity also impacts the global fight against climate change, as healthy coral reefs act

as carbon sinks, absorbing carbon dioxide from the atmosphere. Thus, the environmental consequences of destructive fishing extend beyond immediate ecological damage, posing a threat to global environmental stability.

Destructive fishing practices have profound economic implications for individuals, communities, and the nation as a whole. Coastal communities, many of whom rely on fishing as their primary source of income, bear the brunt of these impacts. As fish populations decline due to overexploitation and habitat destruction, fishers face dwindling catch sizes, which lead to reduced incomes. Simultaneously, operational costs increase as fishers are forced to venture further offshore in search of fish, consuming more fuel and requiring more advanced equipment. This economic strain disproportionately affects small-scale fishers, who lack the resources to compete with larger, industrial fleets. The economic ripple effects extend to consumers, who face rising fish prices as supply dwindles. For many Indonesians, fish is a staple protein source, and higher prices can exacerbate food insecurity, particularly among low-income households. The economic pressures on fishers and consumers alike contribute to a cycle of poverty and social unrest. When traditional fishing livelihoods become unsustainable, many individuals are forced to seek alternative, often precarious, means of income, further destabilizing coastal economies.

The damage to marine ecosystems also undermines the long-term viability of the fishing industry. Coral reef ecosystems, which support approximately 25% of the world's marine fish species, are essential for sustaining fish populations. The degradation of these habitats reduces the reproductive capacity of fish stocks, making it increasingly difficult to maintain sustainable fishing practices. Over time, this leads to a decline in fisheries productivity, jeopardizing Indonesia's position as one of the world's leading fish-producing nations. Additionally, destructive fishing practices negatively impact related industries, such as tourism. Coral reefs are major attractions for divers and snorkelers, generating significant revenue for coastal communities. The destruction of these ecosystems diminishes their appeal, reducing tourist arrivals and associated economic benefits. The decline in tourism further compounds the economic challenges faced by coastal communities, creating a vicious cycle of environmental and economic degradation.

From a human security perspective, destructive fishing poses critical threats to food security, health, and safety. Coastal communities that depend on fish as a primary food source face dire consequences as fish stocks decline. Fish are a key source of protein for millions of Indonesians, and the depletion of fish populations threatens to increase rates of malnutrition and food insecurity. Dao (2023) notes that fish constitute a significant portion of the diet for half of the world's population, highlighting the global implications of declining fish stocks. The health risks associated with destructive fishing are also significant. The use of toxic chemicals, such as cyanide, in fishing operations can result in the contamination of seafood. Consuming contaminated fish poses serious health risks, including foodborne illnesses and long-term health complications. For coastal communities that rely heavily on seafood, this contamination represents a direct threat to public health. Furthermore, the physical dangers associated with destructive fishing practices, such as explosions or exposure to toxic substances, endanger the lives of fishers and bystanders. Maser et al. (2023) emphasize that these practices can lead to injuries,

poisoning, and even fatalities, particularly when accidents occur during the handling or deployment of hazardous materials.

The ramifications of destructive fishing extend beyond environmental and socio-economic impacts to encompass national security concerns. Indonesia, as the world's largest archipelagic state, depends heavily on its marine resources for economic stability and national development. Fisheries contribute significantly to the national economy, providing employment, income, and food security for millions. However, the degradation of marine ecosystems and depletion of fish stocks threaten the long-term sustainability of these resources, undermining the nation's economic resilience. As destructive fishing erodes the productivity of Indonesia's fisheries, the resulting economic losses and social instability pose significant challenges for governance. Coastal communities facing declining livelihoods are more likely to experience poverty, unemployment, and social unrest. These issues can exacerbate existing inequalities and create conditions conducive to crime and conflict. Moreover, the prevalence of illegal and unregulated fishing activities often associated with destructive fishing undermines efforts to enforce maritime regulations, weakening the rule of law and eroding public trust in government institutions.

A former Indonesia's Minister of Marine Affairs and Fisheries, aptly described destructive fishing as a "national disaster," emphasizing its profound implications for the country's stability. The political ramifications of this issue are significant, as conflicts between local communities, government authorities, and industrial fleets frequently arise over access to marine resources. These tensions complicate efforts to implement sustainable fisheries management and highlight the need for a more integrated approach to addressing maritime security challenges. Christian Buerger's concept of maritime security provides a valuable framework for understanding the broader implications of destructive fishing. According to Buerger (2015), maritime security is a convergent concept that integrates traditional security concerns with broader issues such as environmental sustainability, economic stability, and human well-being. This framework views maritime security as an interconnected ecosystem in which ecological, social, economic, and political dimensions are closely linked. From this perspective, destructive fishing is not merely an environmental issue but a significant threat to socio-economic stability and human security.

The interconnected nature of maritime security underscores the need for a holistic approach to addressing destructive fishing. Efforts to combat these practices must consider their environmental, economic, and social dimensions. Strengthening enforcement mechanisms, promoting community-based resource management, and enhancing public awareness are essential components of a comprehensive strategy. International collaboration is also critical, as many destructive fishing practices involve cross-border activities that require coordinated responses. Destructive fishing represents a complex and multifaceted challenge with far-reaching implications for marine ecosystems, socio-economic stability, and national security. The degradation of coral reefs, depletion of fish stocks, and disruption of coastal livelihoods underscore the urgency of addressing this issue. By adopting a holistic approach that integrates environmental,

economic, and social considerations, Indonesia can strengthen its resilience to the threats posed by destructive fishing. The interconnected nature of maritime security highlights the need for coordinated efforts at local, national, and international levels to safeguard marine resources and ensure the sustainability of coastal communities.

Analysis of Destructive Fishing as an Anthropogenic Disaster

Destructive fishing practices, especially those that utilize explosives, poisons, or other unsustainable techniques, have evolved into a pressing issue in marine conservation and coastal security. These activities have far-reaching consequences for both the environment and human society, making them a clear example of an anthropogenic disaster as defined by modern disaster theory. In this context, destructive fishing serves as a case study in how human actions, particularly those driven by short-term economic gain or lack of enforcement, can trigger lasting ecological and social crises.

The United Nations Development Program (UNDP) defines a disaster as an extreme event that disrupts human life, property, or activities, causing significant adverse impacts on affected communities. A disaster can arise from both natural and human-induced factors. Law No. 24/2007, on Disaster Management in Indonesia, categorizes disasters into three broad types: natural, non-natural (man-made), and social. This classification acknowledges that many disasters are not solely the result of nature's forces but are also the product of human actions that inadvertently or intentionally damage the environment and societies.

In the case of destructive fishing, this practice clearly fits into the category of non-natural or anthropogenic disasters. Unlike natural events such as hurricanes or earthquakes, which are beyond human control, destructive fishing arises from human decision-making, either through intentional malfeasance or due to the lack of sustainable practices. The catastrophic effects of such practices—marine ecosystem degradation, biodiversity loss, social inequality, and economic damage—underscore the need to redefine what constitutes a disaster in the modern age.

When examining destructive fishing from a disaster perspective, the impacts become clear. Destructive fishing techniques, such as dynamite fishing, cyanide poisoning, and electro-fishing, cause immediate destruction to marine habitats and fish populations. However, the damage does not stop there. The effects reverberate over time, threatening the ecological balance of marine ecosystems and the social structures of coastal communities that depend on fishing for their livelihoods. This long-term, cascading damage aligns with the definition of a disaster, which goes beyond immediate impact to encompass prolonged recovery periods and irreparable losses.

Marine ecosystems, such as coral reefs, mangroves, and seagrass beds, play essential roles in maintaining biodiversity, providing shelter for fish species, and contributing to coastal protection. These ecosystems also act as crucial buffers against natural disasters like tsunamis and storm surges, which can cause extensive physical damage to coastal areas. However, when destructive fishing methods are used—such as bombing coral reefs with explosives or using poisons to catch fish—the structural integrity of these ecosystems

is undermined. Coral reefs are vulnerable to such practices, as explosions can shatter the coral skeletons, leaving behind barren, unproductive seafloor. In the case of cyanide fishing, toxic chemicals can kill coral polyps and other marine life forms, further degrading the ecosystem.

Over time, this cumulative ecological destruction disrupts marine food chains. Fish populations, which are essential for both local food security and the global economy, decline sharply. This decline negatively affects not only marine biodiversity but also the livelihoods of people dependent on fishing for income. In the short term, fishers may find themselves catching fewer fish, leading to economic hardship. In the long term, as fish populations dwindle or collapse entirely, entire communities may be forced to abandon their primary source of income, resulting in widespread poverty and food insecurity.

The human dimension of destructive fishing as an anthropogenic disaster cannot be overlooked. In many coastal communities, fishing is not merely an economic activity; it is a way of life, deeply embedded in the culture and social fabric of the region. When fishing practices are disrupted or rendered unsustainable, the social consequences can be devastating. A closer examination of the social impact of destructive fishing reveals how these practices contribute to poverty, inequality, and social instability. As destructive fishing reduces fish stocks, the income of fisherman declines. This puts significant economic pressure on households, often resulting in increased poverty levels. In some cases, fishers may turn to more destructive methods to catch fish in desperation, perpetuating a vicious cycle of environmental degradation and social decline. Moreover, as resources become scarcer, competition between fishers intensifies, leading to conflicts over fishing grounds, rights to resources, and access to markets.

An example of this can be seen in Taka Bonerate National Park in Indonesia, where destructive fishing practices have led to social unrest. According to a case study conducted by Asri et al. (2019), destructive fishing methods, particularly the use of explosives, have contributed to social conflicts between different communities. On Rajuni Island, tensions erupted between the Bugis and Bajo tribes over access to fishing resources. This conflict was exacerbated by the economic struggles that accompanied the dwindling fish stocks, which put pressure on social relationships. The decline in resources created an atmosphere of competition and mistrust, triggering violent disputes that disrupted social cohesion in the region. These conflicts are not isolated incidents but are part of a broader pattern of social instability that occurs in many coastal areas where destructive fishing is rampant. The lack of sustainable fishing practices, combined with growing economic inequality, has the potential to foster social unrest and instability. As communities grapple with the economic consequences of overfishing and environmental degradation, the risk of social conflict increases, further complicating efforts to manage coastal resources sustainably.

Oliver-Smith & Hoffman's (2019) theory on anthropogenic disasters highlights the crucial role of social inequality in exacerbating the effects of human-caused disasters. In many coastal areas, marginalized communities, particularly poor or rural populations, are disproportionately affected by destructive fishing. These communities often lack the resources, knowledge, or technology to engage in more sustainable fishing practices. As a

result, they are more likely to resort to methods that harm the environment, which in turn deepens social inequalities. In some cases, fishers in these communities may not be fully aware of the long-term consequences of destructive fishing, such as coral reef destruction or the depletion of fish stocks. In other cases, the immediate economic benefits of these practices, such as increased catches in the short term, may outweigh any concerns about long-term sustainability. However, the cumulative effect of these unsustainable practices eventually leads to a collapse of the fishing industry, leaving these marginalized communities without viable alternatives for income.

As the degradation of marine ecosystems continues, the capacity of coastal environments to act as natural buffers against environmental hazards is diminished. Coral reefs, mangroves, and seagrasses all play critical roles in protecting coastal areas from storm surges, coastal erosion, and tsunamis. For example, healthy coral reefs absorb up to 97% of wave energy, reducing the impact of ocean swells on shorelines and protecting infrastructure along the coast. However, when these ecosystems are damaged by destructive fishing, their ability to mitigate natural disasters is severely compromised. This creates a double burden for coastal communities: not only are they facing the economic and social consequences of unsustainable fishing, but they are also more vulnerable to the impacts of natural disasters. Coastal erosion, which is exacerbated by the loss of coral reefs, poses a direct threat to infrastructure, agricultural land, and the stability of coastal settlements. With fewer natural protections in place, coastal communities are left more exposed to the forces of nature, creating a vicious cycle of vulnerability.

Destructive fishing is a clear example of an anthropogenic disaster that demands urgent attention. Its impacts are far-reaching, affecting marine ecosystems, the livelihoods of coastal communities, and the broader social fabric of society. From an environmental perspective, the loss of biodiversity and the degradation of marine habitats have long-lasting consequences, while the social impacts—poverty, social conflict, and inequality—pose significant challenges to social stability. To address this issue, it is crucial for governments and local communities to recognize the connection between destructive fishing and disaster management. Treating destructive fishing as a disaster—a man-made, slow-burn disaster—can help mobilize the necessary resources and interventions to mitigate its impacts. Disaster risk reduction (DRR) strategies should be integrated into national and regional policies, focusing on sustainable fishing practices, community education, and stronger enforcement mechanisms to prevent the use of destructive fishing methods. Effective DRR can contribute to the sustainable development of coastal communities, ensuring that future generations can continue to rely on marine resources for their livelihoods while maintaining the health of the oceans. As Giddens (1999) suggested, destructive fishing is a "manufactured risk," a human-made disaster that can be mitigated through informed policy, community participation, and long-term sustainability efforts.

CONCLUSION

This study provides a comprehensive analysis of destructive fishing as a significant threat to maritime security, categorizing it as an anthropogenic disaster due to its severe impacts on marine ecosystems and socio-economic conditions in coastal areas. Unlike previous studies that predominantly view destructive fishing as an environmental or economic issue, this research uniquely frames it within the paradigm of maritime security and disaster management. By integrating disaster and maritime security theories with case studies, this study highlights the multidimensional nature of destructive fishing, which not only degrades marine ecosystems and threatens the livelihoods of coastal communities but also undermines food security and national stability.

The findings underscore that destructive fishing constitutes a form of human-induced disaster with far-reaching implications across multiple sectors. This categorization introduces a new perspective for understanding and addressing this critical issue. By conceptualizing destructive fishing as an anthropogenic disaster, this study establishes a strategic foundation for developing robust and integrated solutions to enhance maritime security and ensure the sustainability of ecosystems and coastal communities.

Therefore, it is recommended that there should be increased monitoring and strict enforcement of laws against destructive fishing practices. Education and training of coastal communities on sustainable fishing practices should be intensified. The integration of maritime security policies with disaster management is needed to strengthen responses to the negative impacts of destructive fishing and to ensure the security and sustainability of coastal areas.

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Constitution

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