

Fishermen's Adaptation Strategies to the Famine Season: A Study of Fishermen's Responses on the Northern Coast of Java to High Waves

Hana Maryam Rohmah¹, Suyanto¹, Divara Aurellia Athallah¹, Dessya Aneira Laksono¹,
Halimah Qurratul Aini¹

¹Faculty of Humanities, Diponegoro University, Semarang 50275, Indonesia

*Corresponding author: suyanto@live.undip.ac.id

Abstract. The lives of fishermen are highly dependent on sea conditions, especially wave height and wind speed. During certain seasons, wave height and wind speed increase, hindering the activities of fishermen; this season is called the lean season to indicate a shortage of fish for the fishermen and a time when they cannot go to sea. The sea is a vital place for fishermen; if they cannot go to sea, how can they sustain their daily lives? Based on this, the problem formulation in this research is how the impact of the lean season and the adaptive strategies of North Java coastal fishermen respond to the seasonal change into the lean season. The objective of this research is to describe the forms of cultural responses of North Java coastal fishermen in facing the dry season. This research uses a qualitative approach and data collection through in-depth interviews and relevant literature studies. The research results show that the fishing community on the North Coast of Java is experiencing the impacts of economic instability, material losses, savings, and changes in fishermen's routines. Therefore, an adaptation strategy was developed as a response to survive the lean season, which included diversifying jobs such as becoming construction laborers, boat painters, traders, and casual workers. This adaptation strategy is carried out by coastal fishermen in Central Java with limited skills and economic capital.

Keywords: North coast of Java, lean season, adaptation, fishermen, job diversification.

1 Introduction

As the largest archipelagic country in the world, Indonesia has 17,499 islands from Sabang to Merauke. The total area of Indonesia is 7.81 million km², consisting of 2.01 million km² of land, 3.25 million km² of ocean, and 2.55 million km² of Exclusive Economic Zone (EEZ). As a country with a larger water area than land area, Indonesia is referred to as a Maritime Nation (1). As a maritime country, Indonesia has great economic potential in the fisheries and marine sectors, which include fishing in the sea and aquaculture. Our marine fisheries are supported by the vastness of the sea, and aquaculture by the many types of cultivation that can be carried out (2). Indonesia's marine resources have significant potential and offer great opportunities to boost national economic growth. Fishing encompasses all activities related to the management and utilization of marine biological resources, ranging

from pre-production, production, processing, to marketing. This includes the capture and cultivation of fish and other aquatic organisms (3). According to Article 1, number 10 of the Fisheries Law, a fisherman is defined as an individual whose occupation entails the capture of fish. Fishermen inhabit coastal regions, serving as a transitional zone between terrestrial and marine environments. Small-scale fishing is precariously positioned due to variations in wind and precipitation, safety assurances, and economic stability. External elements, such as meteorological conditions, significantly influence decision-making in fishing activities (4)

Consequently, fisherman in Indonesia, particularly on the island of Java, partake in other endeavors to augment their income (5). The most significant issue arises when the waves intensify owing to the west monsoon winds, obstructing their ability to venture into the sea for fishing, thereby diminishing their income. This issue is referred to as '*musim paceklik*,' a phrase originating from the Javanese language that signifies a period of diminished harvest or when fisherman are unable to venture out to sea.

The North Coast of Java encounters considerable difficulties in fishing methods and navigational safety owing to the varying attributes of each rainy season. During the west monsoon season, turbulent sea conditions and vigorous winds hinder fishermen from venturing far from the beach, leading to diminished catch and income. In contrast, the east monsoon season provides tranquil waters and more reliable weather patterns, enabling fishermen to venture further offshore and pursue a broader range of species.

The livelihoods of fishermen on the northern coast of Java are very susceptible to the effects of erratic weather fluctuations, including precipitation, strong winds, and elevated wave activity. Research by Freduah (6) examines the effects of stressors affecting small-scale fishermen in Ghana. Socio-economic changes at the local, national, and global levels due to climate change make the fishing sector and the livelihoods of fishermen vulnerable. Shaffril (7) analyzes the adaptation strategies of coastal fishermen to climate change. Climate change has various impacts on fishermen and triggers cultural responses among small-scale fishermen. To face these challenges, coastal fishermen must engage in adaptation activities and develop cultural responses to the stimuli present in their culture.

Previous studies on fishermen and climate change have shown that coastal fishermen in Pacitan Regency, as found by Chorunnisa (8) have adapted through environmental, socio-economic, and institutional aspects. Environmental adaptation involves protecting coastal areas with mangroves, while socio-economic adaptation focuses on minimizing risks through applications, insurance, social relationships, planning, alternative skills, and credit facilities. Damayanti (9) in 2021 focused on the dynamics faced by fishermen in Batu Ampar Village, including the instability of fish prices, dependence on natural conditions, and foreign influence. The fishermen experienced income fluctuations due to unstable fish prices and varying weather conditions, which could hinder their activities. Far Far in 2022 (10) found that fishermen in Ohoi Uat and Ohoi Weduarfer have a negative perception of the impact of climate change, but they are implementing various adaptation strategies. These

strategies include diversifying activities, diversifying fishing gear, changing fishing areas, and utilizing social networks. Another previous studi in Karampuang (11) found that Karampuang island fishermen use basic fishing gear and earn little. In the off-season, fishermen struggle to meet their needs, so they turn to gardening and growing corn, cassava, and vegetables.

This six-month famine from October to March prevents fisherman from fishing. This prevents fishers from fulfilling their needs. Fisherman at Kuala Langsa (12) experienced high waves manifest from November to January, prompting fisherman to refrain from venturing into the water. In December, it was discovered that the catch was exceedingly low, if not entirely absent. Another study in traditional fishermen's famine survival tactics. Fisherman have many famine survival strategies to use government aid, engage family, with fishermen assisted by husbands, children, and sisters-in-law, use borrowed funds and savings, and find extra work as housemaids, do other duties, and farm labor (13).

In West Java with its wide coastline, Pangandaran (14), showed that Bojong Salawe fishermen need revenue beyond fish captures during the lean season. Since 85% of fishermen are still productive and 53% depend only on fish catches, a circular economy can boost their income. In addition, Yuniarti (15) researched the adaptation of fishermen in Bantul and Gunungkidul, in Central Java regencies during the moonson west season, using passive strategies by saving expenses and consuming affordable food. Another study in Bontolebang, North Sulawesi (18) showed that the strategy adopted was an adaptation strategy, and a job diversification strategy by empowering fisherwomen and women-headed households (WKRT) of fishermen, both related to fishing and outside activities. Job diversification opportunities have a dependence on nature that provides resources, so that resource potential is optimized in job diversification alternatives. Another study in Tugu, Semarang City (19) show that climate change in the coastal area of Semarang City is increasingly intensifying over time. These changes include alterations in wind speed, wave height, and rainfall. The impacts felt by fishermen include changes in fishing patterns, a 0.5% increase in fishing costs, and a 10% decrease in catch results.

The response of the fishing community is crucial to provide a broader context for this research, as it refers to the actions, practices, and beliefs developed by community groups in response to environmental, social, or economic challenges. This research aims to explain the impact of the dry season on the northern coast of Java and adaptive strategies to survive amidst economic instability.

2 Methods

This study employs a descriptive qualitative methodology to examine the adaption techniques devised by fishermen on the North Coast of Java in response to the lean season. Creswell (16) asserts that qualitative research emphasizes on the subjective meanings created by individuals within a particular social setting. This method entails the examination of narratives, experiences, and subjective judgments of fishermen concerning their circumstances, yielding complete and significant data. Data collection will involve comprehensive interviews with traditional fisherman

throughout the northern coast of Java, observation, and in addition to a literature assessment that includes the examination of periodicals and scientific articles pertinent to the research issue. The data gathered will pertain to fishermen affected by the lean season and strong waves, along with their adaption measures to sustain their daily livelihoods.

This research will employ purposive and snowball sampling strategies to accurately and comprehensively capture the fishermen's opinions by selecting informants. Purposive sampling will be employed to pick fishermen who fulfill specified criteria: they must be active traditional small-scale fishermen with considerable experience in enduring lean seasons and strong waves, exhibiting typical adaptive responses when unable to get to sea. The analysis of data is performed according to the Miles and Huberman framework (17). This study employs data analysis according to the Miles and Huberman paradigm, the phases encompass data reduction, data presentation, and conclusion formulation.

3 Result and Discussion

3.1 The Impact of *Musim Paceklik* Leaves Fishermen Choking

From December to March, the west monsoon hits the coastal areas of Indonesia, especially the northern coast of Java. Many fishermen choose not to go to sea during this period due to high safety risks and damage to fishing gear. As a result, income has drastically decreased due to the decline in catch. This season occurs when the west monsoon flows to Australia from the Asian continent. During this season, the western and central regions of Indonesia, including the Java Sea, experience significant rainfall, strong winds, and high sea waves. Fishermen usually reduce the number of times they go to sea or even completely stop their fishing activities. A fisherman on the northern coast of Semarang named Tono, who has been fishing for 14 years, stated that *"The lean season usually occurs from December to March or during the school promotion period." Usually, fishermen take a break, whether they eat or not, as long as it's safe*

During this period, waves in the Java Sea can reach heights between 2.5 and 4 meters, which is very dangerous for small and medium-scale fishing boats. Most fishermen on the northern coast of Java use small wooden boats that lack adequate navigation and safety equipment. In addition, there is stricter supervision from the local community and the water police to prevent fishermen from going to sea. They lost income during the drought due to a lack of resources and technology. High waves can cause losses for fishermen due to damage to boats and fishing gear.

At the beginning of February 2024, seven fishing boats in Kampung Nelayan Tambak Lorok, Semarang capsized, three houses collapsed, and seven houses were damaged due to high waves, leaving behind tidal flooding. This has prompted the coastal community of North Semarang to urge the local government to accelerate the construction of a sea wall. The losses have forced the coastal residents to spend more money on repairing houses, boats, and purchasing fill soil to elevate their homes. Antoni, a 55-year-old fisherman, was forced to evacuate with his family because their house collapsed due to the waves.

"Everyone had to leave because the house fell down. The walls fell down one by one, and everything fell down." Before, the

waves would crash right into the home while we were sleeping. We ended up having to drain it all the time. We even bought up to three truckloads of soil for the side of the home, added bamboo, and spent around one and a half million dollars, but when the waves arrived, everything was gone. The electronics and other objects in the house were destroyed, and the tidal water took away goods like buckets, ladles, and cutlery. I couldn't sleep properly last night since the waves were so high for a month. It was scary.” (Interview results with Antoni on March 29, 2024)

This situation has a significant impact on the daily lives of fishermen. Their routine from morning to night has changed because they need to make home repairs, evacuate, and stop working temporarily. This material loss further worsens the financial condition of the coastal community, forcing them to make extra savings by cutting food expenses or even fasting to endure hunger. Mashyur, a 54-year-old fisherman, during the lean season in March 2024, coinciding with the month of Ramadan fasting for Muslims.

“Paceklik a big problem, but the sea's bounty is very important for the wife's and kids' food needs. We usually eat a lot, but now we just eat what we have, as long as there's rice. Sometimes I paint boat to get money but now the waves have settled down so we can go fishing again. The waves have only been calm for a week; we were on break for weeks. During the month of Ramadan, we had support, so we didn't feel hungry while we were fasting and could save money. As Eid Scottish, Alhamdulillah we can at least buy new clothed for the children retirees and offer gifts to the people we visit, whether it's a new sarongs or caps, so we can continue the practice of visiting family.” (Interview with Mashyur on March 29, 2024)

Besides traditional fishermen, the impact of high waves is also affecting green mussel farmers. Bamboo stakes for green mussel cultivation (*Perna viridis*) are often swept away by the waves. Sucipto, a 57-year-old fisherman from the northern coast of Semarang, was a capture fisherman who stopped going to sea due to high waves and switched to cultivating green mussels for easier access, but he still suffered losses due to a decrease in harvests.

“We plant one bamboo stake that is 3 to 5 meters long, and it can grow more than five kilograms of shellfish. We sell one kilogram for seven thousand.” There are a lot of harvests, though, depending on how many bamboo stakes we plant. Sadly, we can only harvest from the 150 bamboo stakes that are still standing. The others were washed away by the seas. There should have been more than 200 bamboo stakes.” (Interview with Sucipto on March 30, 2024)

This decline in income creates a domino effect, where family economic stability is threatened, the ability to meet basic needs decreases, material losses occur, and even the risk of falling into a debt cycle emerges. This underscores the importance of the sea as the main source of livelihood for fishermen, but there is a response from the fishermen in the form of adaptation strategies to changes in their economic sources, namely through livelihood diversification.

3.2 Job Diversification as a Form of Fishermen's Response

Many fishermen and their family trade, cultivate, or do odd jobs to supplement their income during the lean season and seek loans. When faced with economic uncertainties like droughts or harsh weather, traditional fisherman adopt several adaptive tactics to survive. Hard work is flexible and adaptive, therefore most fishers choose it. Marwan, 46, a fisherman with an elementary education, wants to work despite his inadequate skills. He achieves this while upholding fishing community values, tenacity, and resilience. Because fishermen have few talents outside of fishing, they rely on physical strength, which coastal dwellers who work hard frequently have. Fishermen find construction laborer jobs easy because they need physical strength.

"I usually work as a construction worker when I can't go to sea because the waves are high or the wind is blowing from the west." But, you know, there's not always work; I can only join when there's a project. I help transport sand, mix cement, or paint while houses are being built or fixed up. It's enough, even though it's not the same as fishing, but it helps keep the kitchen going. If I don't have any tasks to work on, I typically remain home and fix nets, cultivate veggies, or do anything else that is halal and can help me make money." (Interview with Marwan on May 3, 2025).

Due to reliance on variable catch revenue, individuals encounter precarious circumstances in fulfilling their home requirements, particularly sustenance (20). Cultivating vegetables in residential yards has emerged as a viable option for coastal communities to attain food sovereignty, particularly as a sustenance source during the scarcity period.

"I normally work as a construction worker when I can't go to sea. But there isn't always work; I can only participate in when there's a project. I help transport sand, mix cement, or paint while people are building or fixing up their homes. It's enough, even if it's different from fishing and makes me tired. I mainly remain home and fix nets, cultivate veggies, or do anything else that is halal and can help me make money." (Interview with Mahysur on May 3, 2024)

The fishing community's perseverance, persistence, and survival are shown by their resolve to work even without functioning businesses. Fishermen adapt using

their money and social connections. A strong marine culture is essential to a nation's maritime defense, demonstrating culture's impact on national interests. Indigenous knowledge in marine resource management greatly affects fishermen's social and economic status.

4 Conclusion

The coastal communities of northern Java to many challenges, especially during the lean season, including high wave surges, temporary fishing cessation, strong winds, adverse weather, diminished catches, changes in community routines, increased savings, damage to homes, boats, and fishing equipment, repair costs, and economic instability. To survive economic instability, the fishing communities along Java's northern coast have taken on a variety of jobs, including construction, boat painting, grocery stores, trade with their spouses, miscellaneous jobs, and fishing equipment repair. This technique relies on social solidarity through mutual aid, informal labor jobs, and financial loans. This reaction shows that powerful wave adaption mechanisms and external dynamics force fishing communities to constantly modify their economies and social networks to survive.

References

1. Calon P, Negeri P, Kelautan K, Perikanan DAN. Kementerian Kelautan Dan Perikanan Republik Indonesia Kementerian Kelautan Dan Perikanan. KkpGoId. 2019;(16).
2. Arrazy M, Primadini R. Potensi Subsektor Perikanan Pada Provinsi-Provinsi Di Indonesia. Jurnal Bina Bangsa Ekonomika. 2021;14(1).
3. Judiyanto. Perikanan. PT. Penerbit Qriset Indonesia; 2024.
4. Manapa ES, Samad W, Sultan, Sampetoding EAM. Fluktuasi Angin dan Curah Hujan Periode 2012-2020 dan Dampaknya Terhadap Produksi Ikan Di Pelabuhan Paotere Makassar. Jurnal Ilmu dan Teknologi Kelautan Tropis. 2023;15(2).
5. Kamiludin F, Setiadi H, Sumadio W. Livelihoods sustainability pattern in Sangrawayang Village, Simpenan District, Sukabumi Regency. In: IOP Conference Series: Earth and Environmental Science. 2020.
6. Freduah G, Fidelman P, Smith TF. The impacts of environmental and socio-economic stressors on small scale fisheries and livelihoods of fishers in Ghana. Applied Geography. 2017;89.
7. Shaffril HAM, Abu Samah A, D'Silva JL. Climate change: Social adaptation strategies for fishermen. Mar Policy. 2017 Jul 1;81:256–61.
8. Choirunnisa LAD, Purwaningsih Y, Prasetyani D. Adaptasi Nelayan Pesisir Kabupaten Pacitan Akibat Perubahan Iklim. Jurnal Wilayah dan Lingkungan. 2022;10(2).
9. Damayanti Gultom D. Buddayah: Jurnal Pendidikan Antropologi Melepas Sauh Sisa Seling: Dinamika Nelayan Lepas di Desa Batu Ampar. Jurnal Pendidikan Antropologi. 2021;3(2).

10. Far Far RA, Tuhumury SF. Strategi Adaptasi Masyarakat Pesisir Terhadap Dampak Perubahan Iklim di Kepulauan Kei Besar Maluku Tenggara. *Jurnal Akuatiklestari*. 2022;6(1).
11. Asis A. Strategi Bertahan Hidup Nelayan Karampuang dalam Pemenuhan Kebutuhan Hidup. *Pangadereng: Jurnal Hasil Penelitian Ilmu Sosial dan Humaniora*. 2019;5(1).
12. Khalfianur W, Niati CR, Harahap A. Pengaruh Gelombang Laut Terhadap Hasil Tangkapan Nelayan Di Kuala Langsa. *Jurnal Ilmiah Samudra (AKUATIKA)*. 2017;1(2).
13. Nainggolan HL, Aritonang J, Ginting A, Sihotang MR, Gea MAP. ANALISIS DAN STRATEGI PENINGKATAN PENDAPATAN NELAYAN TRADISONAL DI KAWASAN PESISIR KABUPATEN SERDANG BEDAGAI SUMATERA UTARA. *Jurnal Sosial Ekonomi Kelautan dan Perikanan*. 2021;16(2).
14. Thirafi L, Akbarsyah N, Fauzan F. Sosialisasi dan Penggalian Potensi Penerapan Ekonomi Sirkular dalam Upaya Meningkatkan Pendapatan Nelayan Bojong Salawe Kabupaten Pangandaran. *Jurnal ABDINUS: Jurnal Pengabdian Nusantara*. 2023;7(3).
15. Yuniarti D, Sukarniati L. STRATEGY COPING DAN PENDAPATAN NELAYAN: SEBUAH KAJIAN EMPIRIK. *Jurnal Sosial Ekonomi Kelautan dan Perikanan*. 2021;16(1).
16. Afridania Y, Elvawati E, Rahmadani S. STRATEGI BERTAHAN HIDUP BURUH NELAYAN TRADISIONAL PADA MUSIM PACEKLIK. *Jurnal Pendidikan Sosiologi dan Humaniora*. 2022;13(2).
17. Heriza B, Mulianingsih F. PERAN MODAL SOSIAL DALAM KESEJAHTERAAN MASYARAKAT NELAYAN TAMBAK LOROK SEMARANG UTARA Info Artikel [Internet]. 2023. Available from: <http://journal.unnes.ac.id/sju/index.php/SOSIOLIUM>
18. Fitriani I, Sawiji A, Noverma N. ESTIMASI PENDAPATAN DAN TINGKAT KERENTANAN PENGHIDUPAN NELAYAN DALAM MENGHADAPI VARIABILITAS MUSIM DI KABUPATEN LUMAJANG. *Jurnal Sosial Ekonomi Kelautan dan Perikanan*. 2021;16(2).
19. Lailiyah A, Juhadi, Tjahjono H. Strategi Coping Nelayan Terhadap Perubahan Iklim Studi, Pada Masyarakat Nelayan di Kecamatan Tugu, Kota Semarang Jawa Tengah. *Geo Image*. 2018;7(1).
20. Setyorini DT, Mukson M, Dwiloka B. ANALISIS KETAHANAN PANGAN RUMAH TANGGA DI WILAYAH PERTANIAN DAN PESISIR KABUPATEN DEMAK. *Journal of Nutrition College*. 2023;12(1).