

TBTI GLOBAL BOOK SERIES

WINDOWS INTO THE WORLD OF MALAYSIAN SMALL-SCALE FISHERIES



**GAZI MD NURUL ISLAM
HEMAVATHI GUNASEGARAN**

Editors

Windows into the World of Malaysian Small-Scale Fisheries

Edited by

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&
Hemavathi Gunasegaran

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Too Big To Ignore Global (TBTI; <https://tbtiglobal.net/>) is a research network and knowledge mobilization partnership supported by over 800 members from around the world. The network aims at elevating the profile of small-scale fisheries, arguing against their marginalization in national and international policies, and developing research and governance capacity to address global fisheries challenges.

TBTI Global Book Series is a publication series that aims to highlight why we need to pay close attention to small-scale fisheries. The series will be of use to anyone interested in learning more about small-scale fisheries, especially about their important contribution to livelihoods, well-being, poverty alleviation and food security, as well as to those who are keen to help raise profile of small-scale fisheries in the policy realm.

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Preface

The e-book “*Windows into the World of Malaysian Small-Scale Fisheries*” does what windows are meant to do – they let us see through, inside and out, shedding light about what researchers might need to do as an initial attempt to better understand what is happening in small-scale fisheries. Small-scale fisheries are known to be highly diverse, but how and why so is not always obvious. They struggle and seem to be facing multiple challenges but they are also resourceful, and, to some extent, can be self-organized to deal with change and uncertainty. Given the right conditions, they can also contribute to addressing societal problems like poverty, food security, and sustainability.

The conditions are not always right for them, however. Through these chapters, we learn about the struggles and the challenges that small-scale fisheries in Malaysia face, as they navigate the change around them. Yet, the essays also reveal opportunities and hope that are pivotal for them, including those brought about by the COVID pandemic. Like elsewhere, small-scale fisheries had to be innovative, especially in the way they marketed and traded their products, due to travel restrictions and other constraints. This is about ‘making anew’, and not making do with what they have alone, as suggested in one of the chapters, which highlights innovative strategies in small-scale fisheries when capital is limited.

Still, many small-scale fishers are trapped in the debt cycle and continue to be dependent on middlemen. Several essays address this issue, looking specifically at how to improve the value chain, including through social innovation and business enterprise initiatives, often involving women groups. This is the encouraging and emerging trend in many small-scale fisheries around the world. These efforts, often supported by research, along with numerous conservation organizations, provide new windows of

opportunities for small-scale fisheries in Malaysia.

Reading the book, one can't help but think of the 1946 classic "*Malay Fishermen*" by Raymond Firth. Firth revealed how fishers drew on social relationships, mutual support, community ties and cultural values to cope with challenges they faced at that time, like income instability, debts, and lack of bargaining power. We see similar stories today in "*Windows into the World of Malaysian Small-Scale Fisheries*", with essays that portray individual fishers, from different generations and various communities, their livelihood and way of life. These life history essays give us insights about why they fish, what they do to sustain their families, and what they see as their future.

Rudy, a 53 years old fisher from Mukah, embraces both traditional knowledge and modern technologies in sustainable fishing practices, and is a strong support of conservation initiatives. En. Yusof, a 56-year-old man from Mersing, took a different journey in becoming a fisher. Although from a fishing family, he left to pursue education but later worked in a state-led initiative aiming at restructuring the local fish distribution system. This gave him an experience about administration and financial management, which he capitalized on when he eventually returned home to fish, taking up from his late father. Then, there is En. Sufian, who is 38 years old, but had an early start as a young boy fishing with his father. Coming from lived experience, En. Sufian's thoughts about why young people do not want to enter the fisheries and how to attract and retain them are worth pondering.

The stories about small-scale fisheries of Malaysia may sound familiar, but they also bring new directions. Dealing with poverty in small-scale fisheries is not about securing jobs and providing alternative incomes for the communities alone, but also about addressing broader issues like subsidies, value chain and biodiversity. Forming partnership between researchers, practitioners, environmental groups, and community-based organizations to deepen our understanding about small-scale fisheries, while learning directly about them through their stories, is a logical way to go about it.

Ratana Chuenpagdee

TBTI Global

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I gratefully acknowledge Universiti Tun Abdul Razak (UNIRAZAK) for providing steadfast support throughout the duration of this e-book project. I offer my heartfelt thanks to the Vice-Chancellor of UNIRAZAK, Professor Datin Paduka Dr. Samsinar Md Sidin and Amil Izham Hamzah, Chief Executive Officer of UNIRAZAK. I am also extremely grateful for the support provided by the members of the Tun Razak Graduate School, with special remembrance and appreciation for the late Professor Dr. Benjamin Chan Yin Fah and Professor Dr. Zulkifflee Mohamed. Additionally, I wish to acknowledge the 'Vulnerability to Viability (V2V): Global Partnership

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On a personal note, I would like to take this opportunity to express my sincere gratitude to the esteemed supervisors of my doctoral thesis: Professor Tan Sri Datuk Dr. Nik Mustapha bin Raja Abdullah, Professor K. Kuperan Viswanathan, and Professor Dato' Dr Tai Shzee Yew. Their inspiration, encouragement, and cooperative spirit in fisheries research have been an enduring source of motivation.

Ultimately, fishing communities remain at the root of all our research efforts, and collaborating with them represents the prime thrust behind the publication of this book. It is my profound privilege to express my deepest appreciation to the small-scale fisheries communities in Malaysia, whose invaluable perceptions are manifested in almost all the chapters comprising this volume.

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Sustainability Strategies to Address Impoverished Fishers' Associations: A Case Study in Asajaya, Sarawak, Malaysia

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Abstract

Fishers' associations play a crucial role in reducing poverty and increasing bargaining power of small-scale fishers. However, there are multiple issues that arise in fishers' association, especially in small-scale fisheries in Malaysia. In this chapter, the issues affecting a fishers' association in Asajaya, a fishing town in the Sarawak state of Malaysia, are discussed. Malaysia is key part of the Coral Triangle, a global center of marine biodiversity and many fishers

are part of small-scale fisheries. The key problems include the marketing of fish products, lack of financial assets and lack of alternative sources of income. This chapter also discusses sustainable strategies to address the issues of poor fisher association. The strategies include creating a functional fishers' association that involves better local participation and government providing financial support to association in terms of marketing activities and infrastructure upgrade.

Introduction

Asajaya is located about one hour from the capital of Sarawak, Kuching. Among the about 1,200 fishers registered in Asajaya, 90 percent are categorized as small-scale fishers. 70 percent of fishers are 50 years old or older. Most small-scale fishers use gill nets, drift nets, and purse seine nets. The most commonly caught species at Asajaya are Bombay Duck fish (ikan lumek) and gonjeng fish (ikan gonjeng). The annual fishing season lasts about eight and a half months. Fishers in Asajaya are generally poor due to the lack of employment opportunities and insufficient income.

There is a fishers' association in Asajaya, whose purpose of forming was to maintain and improve the welfare by providing financial assistance to the fishers in need. Furthermore, the fishers' association plays multiple roles in helping the fishers in Asajaya. For instance, it provides assistance to the local fishers in obtaining diesel subsidies from the government, in obtaining grants from the government to finance the various activities linked to fishing; it also assists the fishers in marketing and processing their fish, to add value to the fisheries products and increase the fishers' income (Lee & Viswanathan, 2024).

However, the fishers' association in Asajaya faces a number of challenges. The key problems include the marketing of fish products, lack of financial assets and a lack of alternative sources of income. This chapter intends to identify the main problems faced by small-scale fishers and the fishers' association in Asajaya, Sarawak. Furthermore, it outlines possible ways to overcome the main problems faced by fishers' association in Asajaya. By

addressing the problems faced by small-scale fishers and the association in Asajaya, it can provide insights that might be helpful in increasing the income of the fishers and reducing inequalities and exploitation that fishers face from the middlemen. This goal is aligned to the United Nations Sustainable Development Goal (SDG goals) of 1 (No Poverty) and 10 (Reduced Inequalities).



Figure 1. Map of the Asajaya River. Source: Adapted from Kira et al., 2022

Methodology

The study was conducted in September 2022. Three fishing villages were visited and a total of 100 fishers were interviewed to explore the problems facing the fishers’ associations. According to the interviewees, the main problems were marketing of the fish products, low participation in the fishers’ association, and challenges in obtaining financial support. A total of 14 women, all of whom are not directly engaged in fishing, were interviewed at kampung Tambirat (Tambirat village). The study found that 90 percent of the fishers located in the area were small-scale fishers that used vessel A (a vessel with weight of less than 40 Gross Registered Tonnage (GRT)). The

most common types of fish caught in Asajaya are:

1. *Lumek* (main fish species caught at Asajaya)
2. *Gonjeng*
3. *Geragau* (prawn)
4. *Popot*
5. *Gelama*

There are varieties of products that could be produced from the fish harvested such as salted fish (from *gonjeng* fish and *lumek* fish), belacan (Prawn Paste) from udang geragau (Prawn Paste) and belacan powder from *geragau* prawn. Female members of the association are involved in these fish processing activities.



Figure 2. Salted gonjeng. Asajaya, Sarawak, 2022 © Authors



Figure 3. The size of geragau prawn used to produce belacan (prawn paste).
Asajaya, Sarawak, 2022 © Authors



Figure 4. Belacan (prawn paste) sold at RM18 per half kilogram at Tambirat village in Asajaya, Sarawak, 2022 © Authors

Results

Problems faced by fishers' association in Asajaya

The domination of middlemen

The traditional fishers in Asajaya are engaged in fishing that occurs within 0-5 nautical miles from the shore. Once the fish is landed at the jetty, the fishers are not able to transport the fish to the market as the market are a far distance from the jetty. Therefore, the fishers sell the harvested fish and fish products to the middlemen as they have close relationship with the fishers, since most of the fishers owe debts to the middlemen (Lee & Viswanathan, 2024). The middlemen are commercial businessmen that do not belong to the fishers' association composed of traditional fishers. They exploit the fishers by buying relatively low price from the fishers and sell it at high price in the market. In principle, the middlemen take over the role of fishers' association by helping fishers to sale their fish.

Fishers rely on middlemen for selling the product through sustainable marketing services. For example, middlemen would buy RM 4 per kilogram of Bombay Duck Fish (ikan lumek) and sold it at the nearest market for RM 10 per kilogram. These middlemen had the sufficient cash to purchase from the fishers. Therefore, fishers were persuaded to sell to the middlemen as they had no choice but to sell the fish to them. Fishers have limited capacity to transport their fish to the nearest market and failing to do so would make them lose the value of the fish. Moreover, the value of fish depreciates if the fish is not fresh.



Figure 5. Traditional fishing vessel (Type A) at Asajaya, 2022 © Authors

Marketing problems

The association also faced marketing problems. Interviews with three association members (manager, assistant manager and the accountant on 18 October 2022) revealed that the main problem faced by the fishers is the marketing of fish. The association did not get sufficient fish from the individual fishers as they prefer to sell their fish directly to the middlemen.

In the peak fishing season, there is an abundance of fish caught by the fishers. At that time, the fishers would sell the products to the association. The association would buy it and store in the freezer. The association managers were not able to sell the abundance of fish to the consumers in the city due to a lesser demand and an excess supply of fish. Furthermore, the fishers' association is lacking the marketing knowledge and logistics capacity to transport the fish to the city.

Fishers' association rely on government support

Fishers' association depends on the government support such as subsidized fuel for operating their boats. They are also reliant of other forms of welfare support from Fisheries Development Authority of Malaysia (LKIM), an agency under the Ministry of Agriculture and Food Security. The fishers' associations in Sarawak have less social and economic power and they often heavily depend on the government support for financial resources (Lee et al., 2020). The associations in Sarawak receive grants from the LKIM, including fish processing facilities grants and education assistance funds (Dawum, 2019). Furthermore, the associations appear to be heavily dependent on government subsidies (Lee & Viswanathan, 2019). The small-scale fishers are therefore vulnerable to income and livelihood risk if government subsidized funding is not available (Schuhbauer et al., 2017; Sumaila et al., 2019; Schuhbauer et al., 2020).

In 2022, the association suffered because it hasn't received any funds from the LKIM Sarawak branch. It was difficult to sustain the fishers' association as it was running out of cash. There was only RM 50,000 left in the account to pay electricity and water bills and other working capital, as told by the manager of fishers' association and other office staff. The association did not have other alternative to create wealth and was heavily reliant on government subsidies to survive.

In 2021, the fishers' association received RM 80,000 from LKIM as part of Special Assistance. Out of total funds (RM 80,000), RM 50,000 was used to purchase fish from fishers to sell in the markets; RM 15,000 was used to repair the lorries (transportation) and RM 15,000 was allocated for the purchase of marketing equipment.

Aging problem: Lack of younger fishers replacing the older generation

Most of the fishers at Asajaya are old and there are very few young fishers to replace them. About 70 percent of fishers were aged 51 years and above (Lee & Viswanathan, 2024). Most of the fishers had earned monthly income of less than RM 1,000 which is below the minimum wage of RM 1,500. Thus, most fishers have not encouraged their sons and daughters to pursue fishing as an occupation. In the long run, this means that the state (Sarawak) will face crisis in the near future due to the dwindling number of local fishers and will be forced to import more fish from overseas to meet the demands by the urban citizens. The fish prices will increase in the coming years, given the lower fish production. The price of fish had increased significantly in the past decades. For example, the price of fish of Bombay Duck Fish in 1996 was RM 0.30 per kilogram. In 2022, the fish price has soared to RM 10 per kilogram, an increase of 33 times (Lee & Viswanathan, 2024).

The lack of young fishers (aged 18 to 45) in the study area also means that the fishers' association in Asajaya might not be sustained by participation of young fishers. The low interest of youth in becoming active fishers also means that the association will not be sustained in the long run as young fishers are crucial for moving the association forward. Young fishers often view the profession of fishers are not being lucrative and as one that does not guarantee high income.

Discussion of way forward to solve the problem of Asajaya fishers' associations

This case study looked at the problems faced by the Asajaya fishers' association and suggest ways to address the problems faced by small-scale fisheries in Sarawak. The main problem faced by the small-scale fishers and the association is the exploitation by the middlemen. The fishers depend on the middlemen wholesalers that purchase fish from fishers at the jetty at low prices and resell the fish in the market to obtain high profits. Thus, fishers' association need to be more functional in terms of capacity building and awareness for reducing the dependence of fishers on the middlemen in order to reduce exploitation (Arshad & Gibbons, 1987; Yahaya, 1988; Yahaya, 1990; Wells, 1990; Muda et al., 2006; Hamdani & Wulandari, 2013; Hamid et al., 2022). Functional and effective fishers' association can help promote social welfare of the small-scale fishers by helping them market their fish and raise income for the fishers. Promoting social welfare of the fishers is crucial and requires active participation of the small-scale fishers in fishers' association stakeholders (Food and Agriculture Organization, 2015).

The solutions to the problems of marketing and creating a functional fishers' association could be through increasing participation of small-scale fishers in the local association. This requires the fisheries department and LKIM to co-manage the fisheries resources with the local fishers. Fishers must be encouraged to participate in monthly meeting and decision-making activities for effective management of fisheries. Fishers' participation in the association is crucial for promoting their welfare through team training. Moreover, exposure to alternative income sources will go a long way in helping fishers to improve their livelihoods. Fisheries extension officers can educate fishers on how to participate actively in fishers' associations and become functional in organizing themselves.

Government must also provide financial support to the association in terms of marketing activities and infrastructure development. Marketing equipment includes better logistics, lorries to transport the fish to different

markets, setting up fish markets nearer to jetty – all of these efforts require funds and should be supported by the government. This effort could help fishers' association to become more effective in serving fishers and could also prevent the exploitation by the middlemen.

Furthermore, there is a need for fishers to have alternative employment opportunities. One of the alternative employment opportunities is to set up more aquaculture activities. The benefits of aquaculture include providing employment opportunities during monsoon season and increasing the fishers' income (Lee et al., 2020). The extension officers, researchers and scientists can help train fishers on obtaining alternative income sources and aquaculture skills through capacity-training activities. Alternative employment opportunities include activities such as becoming tour guides and assistants in tourism promotion, developing eatery outlets, or becoming seafood sellers, thus adding value to the fish that's harvested.

Furthermore, the policy makers need to train the youth on how to become fishers or aquaculture farmers. This is crucial to ensure that the association can be sustained in the long run and engaged in fishing to fulfill the growing population at the state level. Policy makers and universities academics need to join hands to raise public awareness on the importance of the fish industry. Policy makers must ensure that the youth understand the importance of being an aquaculture farmers to increase income. This would help youth to see fishing or aquaculture farming as a viable livelihood option.

Conclusion

This case study provides a good example of fishers who are struggling to improve their wellbeing through a fishers' association. The problems of marketing the fish and low fishers' participation in association continues to be a serious issue in Asajaya. There is a need to focus on improving marketing mechanisms. Collective action among fishers is also a must for moving forward.

To develop Asajaya fisheries, everyone has a role to play. The universities could assist the Sarawak Fisheries Development Authority in helping fishers

to organize themselves through developing the functionality of fishers' association and providing skills-building opportunities to fishers, as well as the latest technology to increase productivity. Moreover, fishers must also be appreciated by the people of Sarawak who should recognize their contribution to food production and food security of Sarawak. Finally, young people must be given incentive by the government to engage in fishing activities. With the efforts from all players, the Sarawak and Asajaya fisheries sector could be developed further in a sustainable way.

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The Impact of Alternative Incomes on Household Expenditure in Small-Scale Fishing Community

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Abstract

The dwindling of fishery resources has led to a noticeable decline in fishers' catches, directly impacting their income and causing significant financial strain and subsequent social implications. The economic pressure often forces fishers to make tough decisions on household spending priority, particularly regarding education and healthcare expenditure. With limited income, many fishers face constraint in supporting their children's pursuit of higher education. In terms of healthcare, fishers often rely on public health system (government clinics and hospitals) that incur minimal costs. However, if these facilities are far off, the increased travel expenses can deter them from seeking necessary treatment. To cope with these financial challenges, many fishers take on additional work to help meet their household needs.

The need to secure extra work, however, leaves them with little time for social interactions, straining their relationships and overall social well-being. Without a secondary source of income, their quality of life and social wellness will likely remain compromised.

Introduction

The decrease in fishery stock not only reduced fishers' catches but also impacted their income and, indirectly, the nation's economy. Malaysia's national fisheries production has fallen from 1.89 million metric tons in 2022 to 1.79 million metric tons in 2023, marking a 5.5% reduction. This decline has raised significant concerns about the country's reliability in food supply. With per capita fish consumption at 44.7 kg per year compared to the global average of 20-25 kg, Malaysia has had to rely on imported fish to meet this high demand. As a result, the fish imports not only created challenges for the country's trade balance but also add difficulties for fishers trying to increase their income, as the influx of imported fish leads to a decline in local fish prices.

Due to these challenges, some fishers are forced to seek additional sources of income to meet household needs. If the fishers do not pursue extra work, certain necessities may have to be sacrificed to ensure that the household's essential requirements are met. As a result of less income from fishing income, the sacrifices that fishers have to make include limited access to quality education and healthcare services. To cope with this situation, some fishers take on alternative jobs to fund their children's education and improve their healthcare.

The issue of insufficient income from fishery activities has also compelled household members to take on the role of head of household, supporting their families through various income-generating activities (IGA) (Hafizah & Aziz, 2012). Similarly, for farmers, non-agricultural income sources are crucial for boosting household earnings within farming communities (Siti Hadijah Che Mat, 2011a) and can help them rise above the poverty line in the short term (Siti Hadijah Che Mat et al., 2011b). Likewise, the

pervasive poverty in Sub-Saharan Africa has driven households in the region to seek solutions through diversification of income sources to move beyond poverty. Additional sources of income within farming communities have been highlighted as playing a significant role in helping the community break free from the cycle of poverty (Siti Hadijah Che Mat et al., 2011).

Studies in Malaysia related to fishers' income have primarily focused on the main source of income, with less attention given to contributions from secondary income (Cavalli et al., 2008; Anna et al., 2011). In light of this, this study was conducted to determine how low fishery income affects livelihoods of the traditional fishers on Langkawi Island in Malaysia, and to examine the influence of additional incomes on the household spending priorities within the fishers' community. The study assists policymakers in formulating strategies to address the challenges faced by fishers and help lift them out of poverty.

Research methods

This study was conducted on Langkawi Island, Malaysia. A total of 86 fishers were randomly selected based on database of the Langkawi Division of Fisheries Development Authority of Malaysia (Lembaga Kemajuan Ikan Malaysia, LKIM). The participants were selected among coastal fishers who conduct traditional fishing operations around Langkawi Island in Fishing Zone A (0-5 nautical miles from the coast). A questionnaire was developed to gather information on the fishers' backgrounds, their households' characteristics, household expenditure, and their status of human, physical, and social assets. In addition to data from the Fisheries Development Authority of Malaysia, the Langkawi branch of Department of Fisheries Malaysia (DOF) also provided the necessary data for this study.

The fishers' primary income derives from fishing, while their secondary income comes from other sources, such as business activities and use of social media platforms including freelance work, additional employment, and earning additional income to bear expenses to repair fishing tools.

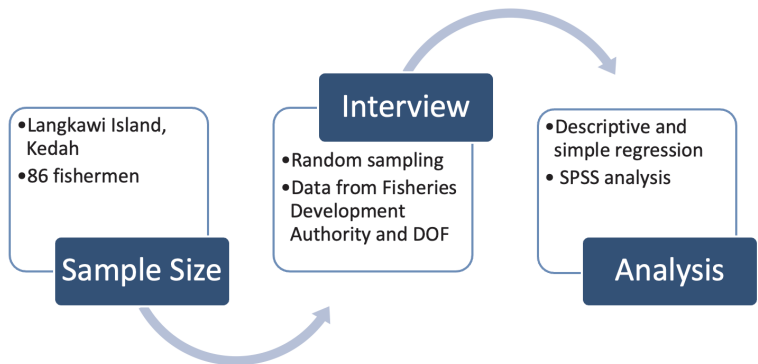


Figure 1. Methodology

Results and discussion

Respondents demographics

Figure 2 shows that among the respondents, there are 37 fishers who were 29 years old or younger, and 29 fishers who were between 30-39 years of age. There were eleven fishers between the age of 50 to 59 years, and six between the age of 40 to 49 years. Only four fishers were above the age of 60.

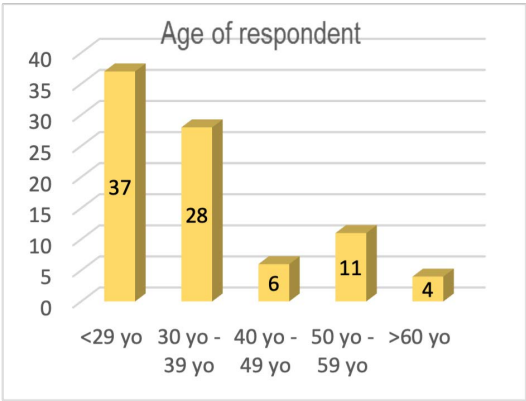


Figure 2. Age of respondents

The majority of fishers in this area are Malay (97.7%) while the rest (2.3%) are other nationalities such as Siamese and foreigners.

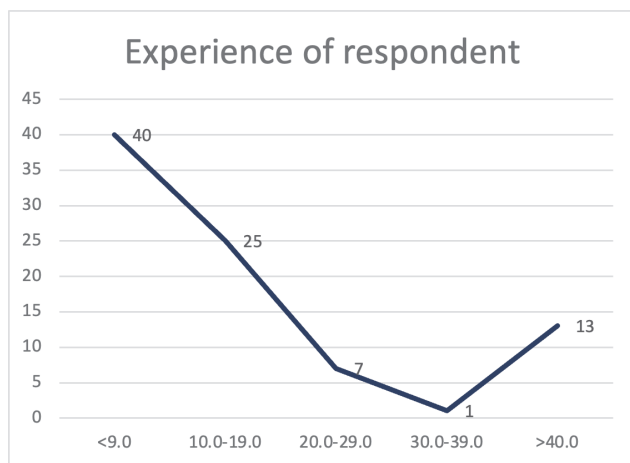


Figure 3. Respondents' fishing experience

Figure 3 shows the total experience of fishers based on years of involvement in fishing activities. Majority of fishers (40 in total) had a total experience of less than 9 years. The highest proportion of fishers has less than nine years of experience. This is driven by the large number of fishers aged below 29 years. A total of 25 fishers had fishing experience that ranged between 10 to 19 years.

Fishers' alternative income

Figure 4 shows the number of fishers without any fishing income, and the average income earned from catching fish. A total of 35 fishers had no alternative income while the remaining 51 people have alternative income source. A total of 17 fisher has an income between RM 251 to RM 300. A total of 16 fishers has an income of more than RM 500. Fishers mostly sell fish at the weekly market. A total of ten fishers had an alternative income of less than RM 100, and these fishers carry out activities such as taking jobs

to repair fishing equipment and doing work in the village such as cutting grass. A total of four fishers had an increase in income of around RM 351 to RM 400. The remaining four fishers have an income between RM 151 and RM 350.

This additional income also affects the overall income of fishers. Table 1 shows that the additional income has a significant effect on the household expenditure of fishers. The results of the study show that alternative income affects the total household income by around 5.8%. Although this amount seem small, the impact is on the fishers' households in the area is significant.

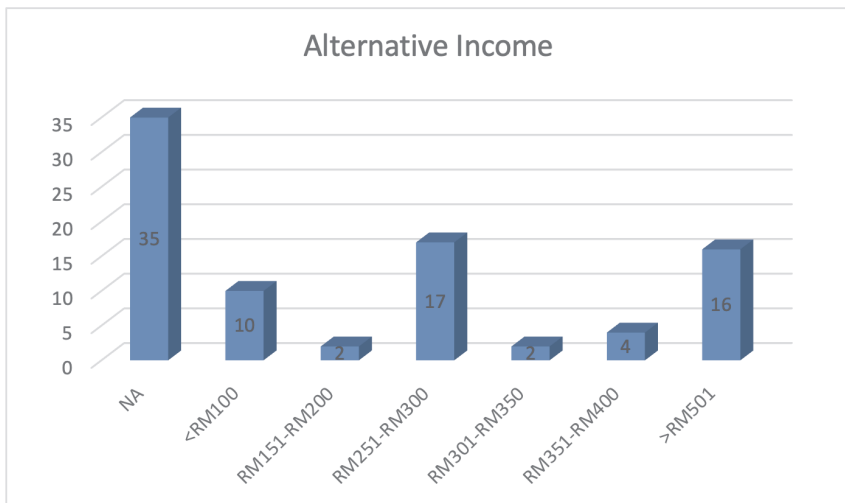


Figure 4. Alternative income of fishers per month

Table 1. shows the regression analysis for the main income of fishers

Variables	Parameter	Significant
Constant	1.360	0.089
Second Income	0.058	***0.000
No of child	0.003	0.858
Seasons	-0.155	***0.008
Experience	0.239	**0.047
Status	-0.024	0.643
Skill	-0.175	0.236
Share	-0.149	***0.005
Role	0.177	**0.046
No of fishing	-0.333	0.364
Equipment	0.017	0.344
Cost	-0.128	**0.034
Help	0.042	0.696
Age	0.002	*0.086
Education	-0.132	0.196
Artificial reef	0.194	***0.010
R ²	0.466	

Figure 5 shows the average difference in fishers' income between fishers who have a second job and those who don't. The figure shows that fishers who have a second income have an average income of around RM 3,492.6 while fishers who do not have a second income are around RM 1,750.10. It clearly shows the difference around RM 1,742.25.

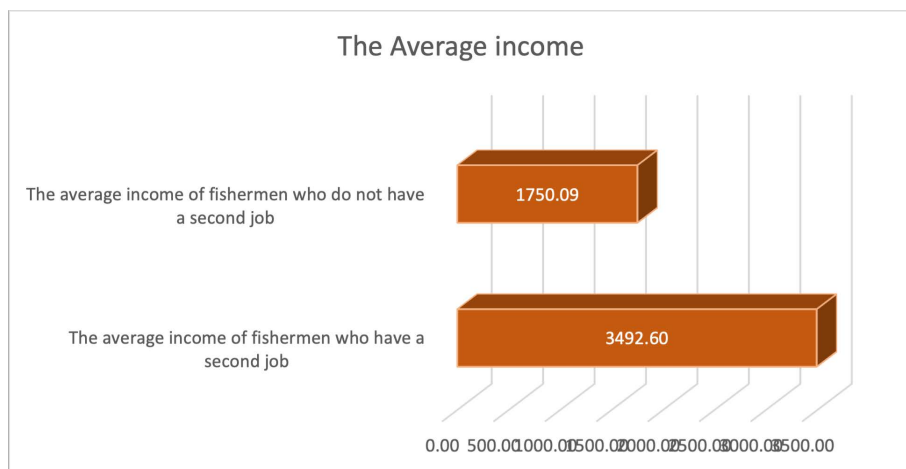


Figure 5. Differences in fishers' income

Household consumption expenditure

Figure 6 shows the pattern of household consumption expenditure for fishers before and after acquiring a second income. Before having an additional income, fishers preferred to spend their income primarily on food, allocating 80% to food, 10% to education, and 5% each to clothing and health. After obtaining additional income, such as an increase of RM 200, fishers allocated RM 100 to food (50%), while the remaining RM 100 was divided between education and health (20% each) and clothing (10%). This indicates that increased income led to higher spending on education and improved health.

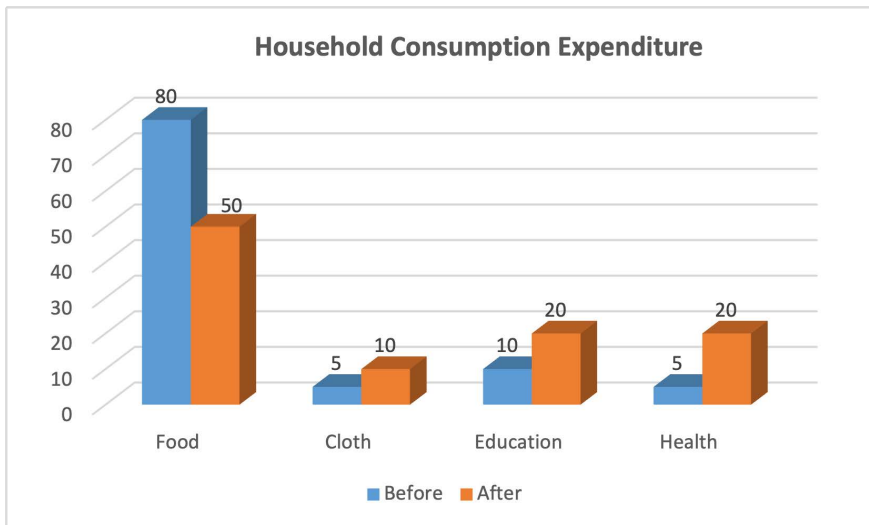


Figure 6. Expenditures of fishing households per month

Conclusion

The result of the study indicates that the additional employment has an impact on the overall income and the expenditure pattern of fishers. When

the overall income level of fishers increases, it can indirectly lead to an improvement in their quality of life. In this regard, future studies should explore other sources of income generating activities that may contribute towards livelihoods of small-scale fishers. Additionally, it is important to assess whether fishers who take on two or more jobs at a time experience a good quality of life.

* * *

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Fish Bombing Ruins the Marine Resources in Kudat, Sabah, Malaysia

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Abstract

Fish bombing is one of the most destructive fishing methods, involving catching fish through explosives, which has adversely impacted small-scale fisheries in Kudat district, Sabah. The present study is designed to identify the impacts of fish bombing on local fisheries by considering the socio-economic consequences and environmental impacts. The research relies on interviews with local fishers and community leaders, and observation of fishing practices over time. Results suggest fish bombing is responsible for the decrease in fish stock levels to such an extent that the local livelihoods of fishers are threatened, and it poses a great threat to marine biodiversity through associated shockwave damage arising from such explosions underwater. Such a pressing problem can be mitigated by implementing community-based surveillance systems. This would require collaboration with the relevant authorities and organizations concerning

enforcement, creating awareness on the harmful effects of fish bombing, and providing alternative livelihood means for fishers affected by such bans to ensure long-term solutions and preservation of fish stocks and marine resources in Kudat district, Sabah State. This research also explores the potential of education and training programs in sensitizing the community to the effects of fish bombing, offering alternative livelihoods that are environmentally conducive and sustainable to affected fishers. Moreover, this research aims to contribute to the expanding literature on the socio-economic and ecological impacts of fish bombing on the Kudat district in Sabah. Thus, this chapter focuses on exploring the harmful effects of fish bombing on the small-scale fisheries in Kudat district and Sabah State and recommending mitigation measures to reduce its effect to ensure sustainable fishing towards the long-term viability of the community's well-being and the marine ecosystem. By understanding the extensive negative consequences of fish bombing on local fisheries, policymakers and community leaders can take appropriate measures to implement stricter regulations, enforce surveillance systems, and provide support for alternative livelihood options. This multifaceted approach will not only discourage the use of fish bombing but also protect the livelihoods of local fishers and preserve the rich marine biodiversity in the area.

Introduction

Kudat Sea, located in the northern part of Borneo, a sea rich in diverse fish varieties, is a significant fishing area and a major and sustainable economic activity for surrounding families (Fox & Caldwell, 2006). Normally, the locally manufactured explosives are combined in glass bottles with a mixture of fertilizer and kerosene in a process that will stun or kill fish for easy harvesting after being let into the water (Mous et al., 2000). Fish bombing is one of the most destructive and illegal methods for catching fish, which threatens the valuable coral reef ecosystem. Fish bombing refers to an act whereby explosives are used for fishing by killing fish, often damaging coral reefs and other marine life. Moreover, fish bombing not only threatens the

future existence of the fishing industry but also poses food insecurity and socio-economic instability for thousands of people who primarily rely on fishing profession for livelihood in the regions (Jaiteh et al., 2016). This study aims to identify how prevalent the practice of fish bombing is in Kudat, its ecological and socio-economic impacts, evaluate existing legal measures that are in place to address the problem, and assess the best feasible strategies that can be implemented to reduce such practices.

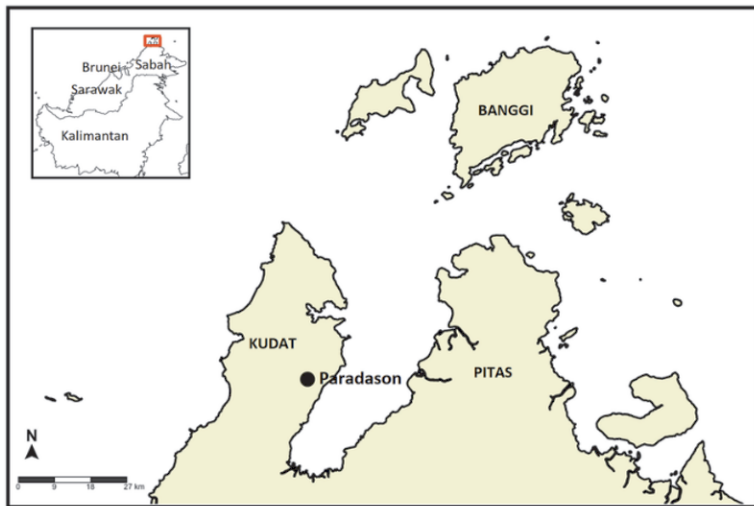


Figure 1. Location of Kudat District, Sabah. Source: Adapted from Chua et al. (2020) under the terms of the Creative Commons Attribution 4.0 International License (<https://creativecommons.org/licenses/by/4.0/>)

Impact of fish bombing on the marine ecosystem

Fish bombing has drastic short and long-term impacts on the marine environment, especially in the Kudat coast of Sabah. The direct effects include the indiscriminate harvesting of fish regardless of their size or species, affecting the young and other non-target fish species, leading to stock collapse. The explosions also damage many coral reefs, which are home to a plethora of aquatic species. Research shows that a single explosion can

kill up to 20 square meters of coral reefs, with the recovery period ranging from decades to nonexistent. Marine life, mainly fish, is threatened by the destruction of coral reefs. The effects of depletion of fish resources and loss of their natural habitats are rather severe. Also, the killing of breeding and nursery grounds for fish greatly hinders the natural restoration of the ecosystem.

Livelihood impact on small-scale fisheries

Fish bombing provides a short-term profit, but it creates a long-term negative effect, as fish stocks are depleted due to unsustainable fishing and habitat loss. Fish bombing activities are dangerous in many ways because they endanger people's lives, threaten security in the marine environment, and affect other stakeholders associated in the marine resources. The primary risk is felt by the users of fish bombing, as they are in direct contact with the explosive materials and are at high risk of suffering severe consequences from handling and exploding these materials. Furthermore, the long-term effects of consuming fish containing explosives residues in their body threaten people's health, especially with neurological and reproductive consequences (Health Canada, 2020). Fish bombing poses a great threat to divers and swimmers, including tourists. This threat not only endangers people's lives but also poses a significant risk to the tourism industry, which many coastal communities rely on for economic sustainability.

Legal and regulatory framework

The Fisheries Act 1985, which does not allow the use of explosives in fishing in Malaysia, and the penalty is a fine of not more than RM 20,000 and imprisonment for a term not exceeding two years. Sabah, an autonomic state in fisheries management, also implements the Sabah Inland Fisheries and Aquaculture Enactment 2003, which bans destructive fishing methods. However, despite these legal provisions, lack of enforcement remains a key

challenge. Due to the vast coastline and the lack of adequate resources of enforcement agencies, constant surveillance becomes a challenge. However, the enforcement is poor to protect the resources, for instance, the standard of proof that is expected in a conviction is usually high, which entails direct evidence of the commission of the act, which is usually difficult to come by due to the nature of the crime. Lack of strict enforcement mechanism and poor community participation in fisheries management contribute to the unsustainable fishing practice in Sabah.

Case Study: Indarason Laut, Kudat, Sabah

Indarason Laut, a coastal village in Kudat, Sabah, is a real-life example of how fish bombing affects people's lives and the seas. Thus, this case study can illustrate the links between the concerns of the economy, cultural and social practices, and environmental pollution. Interviews with local fishers indicate a sharp decrease in fish catches over the last two decades. *"I remember twenty years ago, we used to catch 50 kg of fish per day, but now we are lucky if we catch 10 kg,"* mentioned Ahfad bin Saleh, the old fisher (M. Sharif, personal communication, June 15, 2024). The decline corresponds mainly to the data from the Sabah Fisheries Department, wherein artisanal fish landings dropped 60% in Kudat from 2000 to 2020 (Sabah Fisheries Department, 2021).

Community perceptions regarding fish bombing have become sharply divided. Even though most community members recognize its destructive nature, it is perceived as a necessary evil due to the economic hardships faced in the region. According to one of the community leaders, Fatimah Salleh, *"We know it is wrong, but when your children are hungry, you do what you must"* (F. Salleh, personal communication, 16 June 2024). Interviews with local authorities highlight the challenges in enforcement. Officer Razak from the Kudat Marine Police noted, *"We have limited resources to patrol such a vast area, and perpetrators are becoming more sophisticated in evading detection"* (M. Razak, personal communication, June 17, 2024).



Figure 2. Picture of the village of Indarason Laut © Lanree Asing

Conservation and management strategies

A multi-faceted approach would be needed with regards to effective conservation and management strategies to mitigate the impacts of fish bombing in Kudat, Sabah. Current strategies already taking place include increased patrolling of coastal waters and community-based monitoring systems. MPAs are important in conserving these marine resources and are significant in fish stock recovery with studies showing that effectively managed MPAs can increase fish biomass by as high as 450% over sites without protection (Sala & Giakoumi, 2018). The Tun Mustapha Park, gazetted in 2016, covers much of Kudat's waters and attempts to balance conservation with sustainable resource use.

Alternative livelihood programs are integral to breaking the dependence on destructive fishing. Ecotourism, via some community-based homestay programs in Bangi Island, has supplemented the earnings of some fishing families. Aquaculture development, more importantly the seaweed farming, is a possible alternative with sustainable features, with the Sabah Fisheries Department providing training to local communities (Sabah Fisheries Department, 2020). The feasibility of such programs, however, depends on

many factors, especially market access, skills training, and the amount of initial capital investment. Sperling et al. (2016) state that successful alternative livelihood programs require extended support and sustained market linkages. Innovative approaches, like using technology for surveillance, can also be explored. Underwater acoustic sensors used elsewhere in parts of Southeast Asia can be modified for Kudat (Braulik et al., 2017).

Community-based and stakeholder engagement

Community-based management and stakeholders' engagement in the district of Kudat are integral to addressing fish bombing practices. Moreover, fishers' associations were critical in helping promote sustainable fishing practices and bridge the gap between individual fishers and the regulatory authorities. For example, the Kudat Fishing Community Association organized successful workshops on sustainable fishing techniques and voiced the rights of small-scale fishers (Ali et al., 2019). These NGOs often provide valuable technical support, funding, and, sometimes, calibrated capacity building. WWF-Malaysia has been involved in community-based resource management programs at Kudat, which are already showing promising results (WWF-Malaysia, 2020). For example, it has helped to reduce destructive fishing practices in the region. In this regard, government agencies, like the Sabah Fisheries Department, are considered important, particularly in terms of the regulatory framework and enforcement. Nonetheless, closer links with local communities would be vital for improving their effectiveness.

Conclusion

Fish bombing in Kudat, Sabah, is a complex issue with harmful, far-reaching environmental impacts that contribute to socio-economic pressures. Such practices harm marine ecosystems and compromise food security while undermining sustainable livelihoods. Therefore, multifaceted approaches that combine stricter enforcement, community engagement, alternative

livelihood development, and improved governance are much needed. Integrating scientific management and different stakeholder collaborations offers some potential to handle the devastating effects of fish bombing and ensure sustainable fishing within that region.

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Struggle for Livelihood of Artisanal Fishers in Pulau Ketam

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Abstract

The abundance of seafood dishes is a must at every Malaysian dinner table. No matter the race or religion, we consume seafood like never before. Eating seafood, be it steamed, deep-fried, or stir-fried, brings us together. Undoubtedly, the plates will be empty in minutes. When ordering seafood, especially fish dishes at a restaurant, we typically ask where the seafood is from. Pondering the question, have we ever truly wondered where the fish is from and who catches them and sells them to restaurants owners? The difference between our lives and those of fishers can be vast. For instance, we might live a life of comfort while they may live a life affected by hardships. It is not just about catching and selling seafood. For them, fishing is their livelihood – the only way to survive. This chapter documents the life of Mr. Lim Kim Yong, a fisher living in one of Malaysia's traditional fishing villages,

Pulau Ketam. The chapter also provides valuable insights contributed by the village chief of Pulau Ketam.

Mr. Lim Kim Yong, born and raised in Pulau Ketam, is a 53-year-old active fisher. He is married and has no children. Mr. Chua is the village chief of Pulau Ketam, Selangor, Malaysia. He is a veteran fisher, is married, and has children. He spends his time between Pulau Ketam and Mainland Klang.

Background

There are a few islands located in Selangor, Malaysia, and Pulau Ketam is one that stood out as the epitome of its slow-paced village life, rustic charm, and a place that is far away from the pollution and noise of the bustling city. The name 'Pulau Ketam' translates to Crab Island. It is located 30 nautical miles from the mainland Port Klang, Selangor. Geographically speaking, the island is placed in the intertidal zone, and mangrove swamps surrounded by muddy puddles dominate the vegetation. Pulau Ketam is known for providing fresh-caught fish, crabs, and, most importantly, wild-caught prawns in the Klang Valley area.

In addition, Pulau Ketam is one of the top tourist destinations in the state of Selangor because of its hidden gems such as seafood restaurants, the beautiful historical temples and the simple village life that tourists can enjoy while admiring the breathtaking views. The formation of Pulau Ketam Island began around the 1880s when 3 Hainanese fishers embarked on a journey to catch fish and crabs for a living from mainland Klang to the island itself (Background - Pulau Ketam, 2013). From there, they decided to permanently call Pulau Ketam their home and build their residence on the island. For that reason, many people from Mainland Klang saw Pulau Ketam as an opportunity to start their careers in the fishing industry and earn their livelihood that way. Thus, they migrated to Pulau Ketam and joined fisheries, opening sundry stalls and fish dealer booths. Around the 1940s, the Pulau Ketam population began to grow because the island became a haven for people seeking refuge from the Japanese soldiers due to the World War 2 occupation.



*Figure 1. Boat owners parked their boats near their houses, 2024 ©
Jadabelle Lim Zi Enn*

Circa 1950s, to ease the fishers' ability to maximize and increase their captures and improve their fishing skills, diesel engines and the new fishing net were introduced to the island. Soon, The Pulau Ketam Electric Company was built to provide electricity for this island, long before Tenaga Nasional took over to supply 24-hour total hours of electricity in 2008. The island is home to four fishing villages: Pulau Ketam Township, Bagan Teochew, Sungai Lima, and Sungai Dua. These fishing villages are predominantly Chinese, mostly the Hokkiens and Teochews. There is a minority of Malays, Indians, and Orang Asli from the Mah Meri and Temuan ethnic groups. The Orang Asli mostly live in the Sungai Dua fishing village. The number of residents, houses, and shops had increased tremendously over the years, and other basic facilities have been built, including schools, health centres, banks, post offices, and a police station. The primary economic activity in Pulau Ketam is the fisheries industry, especially small-scale fisheries. Fishers mainly catch crabs, fish, and prawns. On top of that, villagers also run food stalls, restaurants, and sundry shops and work in the civil service.

Pulau Ketam is also famous for the unique construction and architecture

of the villagers' residences. The island is submerged during high tide and muddy when the tide is low, so villagers build 'floating houses' perched on wooden stilts that rise between 1-10 meters (approximately 3 to 33 ft) above sea level. Back then, the villagers built the 'Kongsi House'. It is a large wooden home to be shared with neighbours and families. Hence, it is named 'Kongs', meaning to share (Ch'ng, 2016). There are more than 20 Kongsi Houses located on this island, and it became a heritage artefact since each villager now had a home of their own. Most houses in Pulau Ketam are painted with vibrant colours. Furthermore, the island pave way is narrow and constructed with concrete and manufactured wooden plank bridges. For this reason, no four-wheel vehicles such as cars or vans exist in Pulau Ketam. Instead, villagers commute from place to place and around the neighbourhood with bicycles or electric bikes.



Figure 2. Resident's house that is painted with attractive bold colours, 2024
© J. Lim Zi Enn

“As fishers, we always anticipate catching prawns such as tiger prawns. Those are much more profitable than other seafood caught in the sea.”
[Mr. Lim]

“What makes Pulau Ketam such a unique and surprising place, contrasting it to other fishing villages and islands in Malaysia, is that we have a special lifestyle you rarely experience. That is why many tourists visit the island every month, which helps the people here.” [Mr. Chua]



Figure 3. Resident's and visitors driving electric bikes around the village,
2024 © J. Lim Zi Enn

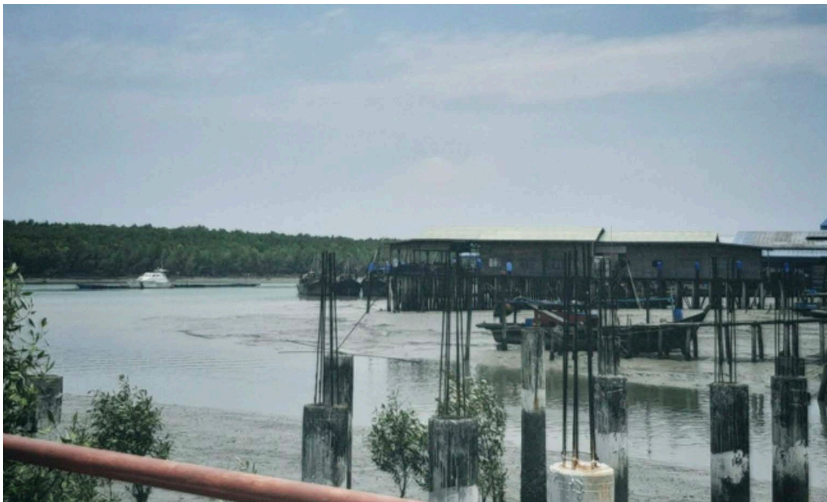


Figure 4. The morning breeze of Pulau Ketam, 2024 © J. Lim Zi Enn



Figure 5. Mini library in a lamp box run by the Rotary Club, 2024 © J. Lim Zi Enn

A conversation with the fishers

This case study primarily uses qualitative methods for data collection. The interviewees chosen for this research are Mr. Lim Kim Yong, a 53-year-old active small-scale fisher born and raised in Pulau Ketam, with over 40 years of fishing experience. He has been involved in fisheries at the young age of 14, as small-scale fisheries are often a generational inheritance. He is married without children. His core philosophy in life is “*for survival, you will do anything.*” Mr. Lim’s reason for being a fisher was due to the lack of education he received. From there, he determined his future by entering the small-scale fishing industry, one that interested him. Moreover, Mr. Chua Kim Lin is the current village chief of Pulau Ketam, Selangor, Malaysia. He is a veteran fisher who shared his experiences in small-scale fisheries, as well as the trials and triumphs of governing the island, championing better livelihoods for the fishing community and its residents. He is married with children and spends his time between Pulau Ketam and Mainland Klang, Selangor.

Furthermore, this study also utilized secondary data to co-support the primary data, such as basic records, documents, and statistics compiled by the various government departments or agencies such as the Department of Fisheries Malaysia (DOF), World Wildlife Fund (WWF), Malaysia’s Fish Development Authority (LKIM), Food and Agriculture Organization (FAO) and the Klang Royal City Council (MBRK). Several data sources are also used in this study, obtained through outsourcing information as tertiary data to support the overall research. These include news articles, blog posts, books, journal articles, conference papers, theses, and dissertations.



Figure 6. Left: Mr. Chua Kim Lin; Right: Mr. Lim Kim Yong, 2024 © J. Lim Zi Enn

Fire incidents in Pulau Ketam

Ever since the establishment of Pulau Ketam, there has been a phenomenon in which the island faces the risk of fire accidents. This is because the houses are built from wood on stilts, so they are exceedingly prone to fires that can spread rapidly, even though the village is surrounded by seawater. Fire accidents happen in Pulau Ketam because of short circuits. The first fire accident occurred in 1967 and destroyed more than 80 houses. In the 70s and 90s, fire struck again and wiped out more than 100 houses and shops. These decades of devastating blazes, some of which have wiped out entire villages, have repeatedly tested the livelihood of the villagers. However, these accidents are not a barrier to the resilience and unity of Pulau Ketam's community. On the contrary, it became a source of hope, springing cooperation into action. On that account, the Pulau Ketam Volunteer Fire and Rescue Services was established in 1972 to safeguard the island and its residents.

“The establishment of the Pulau Ketam Volunteer Fire and Rescue Services is important to ensure the safety of our villagers. We cannot afford another fire accident that will cost valuable lives. It is worth noting that the Fire and Rescue Services was founded because if any fire accidents happen, the Bomba from mainland Klang will not be able to come immediately. It will take a lot of time.” [Mr. Chua]

The most recent fire outbreak took place on 29th of September 2023. What was supposed to be a typical morning became a catastrophe. The fire has burned down several Class C wooden houses, a fishing warehouse and a few fishing boats. Tragically, a 49-year-old woman was declared dead after the Pulau Ketam Volunteer Fire and Rescue Services and the Selangor Fire and Rescue Department were actively searching for her. It is believed that the woman had been inside one of the houses that caught fire during the incident, Mr. Chua said.

“Because of this fire incident, many fishers were forced to stop working to repair the houses and fishing boats. Their income has been affected as they do not have proper boats to travel around the sea to resume work. It is very disappointing.” [Mr. Lim]



Figure 7. The Pulau Ketam Volunteer Fire and Rescue Service at Jalan Merdeka, 2024 © J. Lim Zi Enn

Pirates and illegal immigrant fishers invading Pulau Ketam

There were also some devastating incidents, such as the invasion of Indonesian pirates, that heavily affected the fishing activities and the safety of the Pulau Ketam villagers. These acts represent illegal, unreported, and unregulated fishing (IUU) practices, and are a significant problem for the fishing industry in Pulau Ketam and other parts of the world. IUU fishing refers to fishing activities that are conducted in violation of national or international regulations. These activities are often done secretly and without a valid permit.

“There is one midnight heist where we were awoken by a small group of pirates. They just went to the fish warehouse and stole all the fish and seafood worth thousands of ringgits. They also stole some of our fishing

equipment and boats. I was one of the victims in this incident, and all of us had to face financial burden to cover the liabilities happen.” [Mr. Lim]

Another emerging issue regarding the intrusion of immigrant fishers invading Pulau Ketam’s waters has arisen recently. On March 2024, the Selangor Malaysian Maritime Enforcement Agency (Maritim Malaysia) detected and arrested a C-class fishing boat with four foreign men hailing from Myanmar who were caught fishing without permission in the waters around Pulau Ketamat 7 pm during Operation Ehsan and Operation Tiris 3.0. Malaysian Selangor Maritime Director Maritime Captain Abdul Muhaimin Muhammad Salleh said the suspects were between 26 and 39 years old and did not have valid identification documents. *“All the foreigners and the boat involved were taken to the Pulau Indah Marine Police Force jetty before being handed over to Malaysian Maritime Investigation Officers for further action,”* he said in a statement during a press conference. In addition, it was mentioned that the case was investigated under the Fisheries Act 1985 for violating the valid conditions of the license, which is to use foreigners on board fishing vessels without the written permission of the Director General of the Malaysian Fisheries Department and the Immigration Act 1959/63 for employing foreign crew without a valid permit.



Figure 8. The Pulau Ketam Police Station at Jalan Merdeka, 2024 © J. Lim Zi Enn

It is tragic to see that foreign fishers are invading the island and mercilessly robbing the resources that were supposedly rightfully for the local fishers. On a positive note, the residents here in Pulau Ketam abide by the law and carry out their duties to be morally responsible citizens. It is all thanks to the efforts of the Pulau Ketam Police Force that has kept the peace and harmony on this island and served to build mutual respect and trust among the community.

"I am proud to say that Pulau Ketam has one of the lowest crime rates in Selangor. You can freely walk around the island safely without worrying any public safety issues. Most of the residents are really responsible and kind at heart" [Mr. Chua]

Trawling is the problem for low catch

There is no doubt that in Malaysia, small-scale fishers in this century still typically use traditional methods to catch their daily fish. For fellow fishers, it is a generational inheritance that has been passed down for years. Nevertheless, now, with a twist of modern quirks, their boats are motorized, making it easier, and catches can be numerous. Large-scale fisheries primarily operate trawl vessels and purse-seine gears, while small-scale fisheries utilize gears such as drift or gill nets, hook and lines, traps, and bag nets (Nurul Islam et al., 2021). Some are even creative in making makeshift fishing tools that complement other standard tools, making the catch easier.

Trawling is a fishing method where fishers use towed cone-shaped nets to catch fish and other marine species living on or close to the seabed. These nets are then towed by one or two boats and held open by boards or a metal beam (MSC, n.d.). Despite its contribution to the nation's economy and human consumption, it lies in a grey area, detrimental to the ecosystem. Trawling scratches the seafloor and crushes corals and marine life in the process. While the weighted trawl net is dragged across the seabed, catching fish in its open mouth (Hoong et al., 2025). In the process, juvenile fish were unable to reach their full development, resulting in bycatch. This will affect the fish-growing cycle, which explains the overfishing and shortages.

By combating this issue, the DOF previously implemented that fishers from Zone B, C1 and C2 are only able to trawl with the strict condition that the mesh size of the trawl wing must be limited to a maximum of 5 meters and the length of the head rope must be limited to a maximum of 40 meters. As for Zone A, which is reserved exclusively for small-scale fishers like Mr. Lim himself, the use of trawl nets is completely banned under the Fisheries Act 1985. That is not all; new reports from The Straits Times have reported that Malaysia plans to ban trawling in Zone B (Hoong et al., 2025). It is said that 1,604 trawlers are operating around Zone B, making it one of the most active fishing areas in Peninsular Malaysia and Sarawak. This is because the seafood catch in this zone is diverse, including pomfret, threadfin, mackerel,

crab, squid, and prawn. Nevertheless, Sabah is the only state in Malaysia that will not be affected by such legislation, as it has its jurisdiction.

Under the Fisheries Act 1985 Act 317 Section 25(b), if fishers have been found guilty of offending this law, the penalty will be a fine not exceeding RM 20,000 or a term of imprisonment not exceeding two years or both. To large-scale fisheries, it is just a pinch, but to small-scale fishers, it is a stab in the pocket.

It is good news, as it is the first step in conserving marine life and for small-scale fishers like Mr. Lim himself. This is supported by Tai (2014), who states that the deterioration faced by small-scale fishers is due to disruption or displacement caused by the advent of trawling in Malaysia's marine fisheries.

"If you look at large-scale fisheries, they will be using the trawling method, compared to small-scale fishers like us. Of course, they are going to take the bigger catch." [Mr. Lim]

Not only that, owning drag nets is also prohibited according to DOF due to their similar contradictions to trawlers.

The day-to-day survival of a fisher

The day typically starts almost the same way for all small-scale fishers around the world at 4 am. Mr. Lim and his fellow deckhands prepare the tools and check the boat before setting out to sea, embarking on a 7-to 8-hour voyage in hopes of catching a substantial amount. Mr. Lim's average working days are approximately 15 days in a month because he goes out to the sea early to catch fish and goes home late to ensure he catches sufficient fish and seafood for sale.

"One thing I like about my job is that I have flexible working arrangements. If that week, I get enough catches. We will take a week's rest. I am the boss, I get to call the shots when we work. If we did not hit

our catch quota, by all means, we have work extending to longer periods.
[Mr. Lim]

Fishers can not simply sail to the sea. They must look at the tides and the rising water level. If there are fewer waves and lower water levels, it is safe. Vice versa.” [Mr. Chua]

Once they reach their preferred fishing area, they will set up the nets and traps to catch the fish. It will take 10-20 minutes to accumulate all the fish, and afterwards they will pull up the nets and release their catch. Then they sort out the catch and place it in a Styrofoam box filled with ice to keep the seafood fresh. It is then ready to be distributed. Mr. Lim has mentioned that he needs to be back as soon as possible because he does not want to miss out on the jackpot of the day - putting the fish up for bidding.



Figure 9. The resident's houses and fishing boats in Pulau Ketam, 2024 © J. Lim Zi Enn

Back then, we believed the notion that the ocean is limitless, so the immeasurable fish freely swam around the blue, salty deep waters. It is 'the

world is your oyster' moment for small-scale fishers because they know they can make a profit out of it and put bread and milk on the table. Unfortunately, it proved us wrong. The fish catch has declined in the Straits of Malacca, said Mr. Lim when discussing the topic of overfishing.

Sometimes, if you reach your usual spot to catch fish, you will get one instantly. If not, you have to go further. You must rely on luck, said Mr. Lim.

The difference between big-scale and small-scale is the capability to catch. Moreover, for big-scale fishers, they will be out at sea for 3-5 days without going home, said Mr. Chua.

Mr. Lim has also shared that to catch an abundance of fish, working together successfully is on the books. He mentioned that there are many types of small-scale fishers that specialize in their job scope.

They are many fishers whose job are different from one another: some fishers are good at driving the boats and detect the best area to catch fishes, some are masters in either using drift nets, traps or hooks. Others even 'invent' their own techniques of catching shellfishes or uses traditional tools that have been passed down from their ancestors. Of course, I know most of them! said Mr. Lim.

Another culprit towards the declination of fish is also because of total of human-made pollution that had adverse to the sea. The Star (2023) has reported that climate change and ocean acidification twin silent killers that have caused a significant decrease in fish landings.

The luck of earning a 'reasonable' profit

In Pulau Ketam, many fishers resort to different ways to distribute their catch for earnings. After docking his boat, a fisher and his team carry boxes of their daily catch to the fish bidding house to meet with the middleman. The middleman can also be identified as the fishmonger itself or 'the fish agent.' Their role is to bid for the fresh catch and distribute it to other parts of the region, including fishmongers, sellers, and seafood restaurants (Merlijn, 1989). In this case, the middlemen in Pulau Ketam distribute the goods around the regions of Klang Valley. The process for fish bidding involves

the middleman reviewing each of the fish catches. From there, Mr. Lim prays hard to strike a decent fish deal.

Then, there will be many middlemen who will shout out their prices, and Mr. Lim will write down the best price on a piece of paper before striking a deal with the best buyer. The excess fish left will be Mr. Lim's lunch and dinner. However, if he has extras, he will share his portion with neighbours or fisher friends. He strongly emphasized that the island philosophy is one of sharing and caring.



Figure 10. A fishmonger butchering freshly caught fish early in the morning,
2024 © J. Lim Zi Enn



Figure 11. Sun-dried shrimp and anchovies (ikan bilis made by Pulau Ketam's locals, 2024 © J. Lim Zi Enn



Figure 12. Freshly caught fishes displayed for sale, 2024 © J. Lim Zi Enn

“If I am capable of catching extra fish or seafood to take home, I will definitely offer my neighbours or friends the goods for free. I do that because we live by the principle of sharing. When there are times I may have insufficient fish or other foods. They also help me and give me things without asking something back. [Mr. Lim]

Arrisuta & Kholis (2024) mentioned that although fishers can earn more by selling directly to consumers and retailers, many do not because they are unfamiliar with market prices or lack the means to transport seafood.

Aingaran (2023) shared that fish bidding is a dynamic marketplace that serves as a central hub for the entire fish trade. Rubendran, a tour guide and a representative from Tourism Selangor, strongly emphasized that the variety of aquatic life (fish and seafood) also underscores the economic vitality of Pulau Ketam’s fishing community.

Sadly, many fishing villagers in most fishing towns in Selangor harbinger that catches have continued to decline over the span of years (Bedi, 2024). The worst part is that fish and seafood prices have skyrocketed through the roof, making it a costly protein in the Malaysian diet.

As if the lives of a fisher are based on their luck. Nightmare struck during the COVID-19 pandemic when numerous fishers lost their primary source of income due to social distancing measures. It affected the country’s food supply chain, with 52.6% of fishers’ income being affected. As many as 33% of our fishers have lost their source of income since they are prohibited from returning to the sea and selling their fish to middlemen (Mohd Arzaman et al., 2022). For Mr. Lim, the only way to sustain himself is by doing the only job he knew. Unfortunately, the disease has put progress on hold with uncertainty.

“I cannot go out to fish; my one and only source of income has been gone for months. I almost used up my savings. That was a colossal loss.” [Mr. Lim]

Nevertheless, as time passes, the restrictions become lighter. Hence, fishers were able to resume their work on a small scale. It even opened up opportunities for individuals who have unfortunately lost their jobs, such as pivoting to selling fish. They will connect with small-scale fishers and make a deal to trade. On the bright side, both parties can gradually recover from the financial burden.

Mr. Lim has shared that during the COVID-19 pandemic, many middlemen were unable to offer a satisfactory price due to market fluctuations and volatility. As a result, many fishers either got into arguments or earned less than what their catch was worth. Luckily, independent fish sellers are much easier to negotiate and transparent so eventually sparked a new unlikely business partnership. A win-win situation.

The decline of Pulau Ketam's youth participation in fisheries

Pulau Ketam, the once prosperous and lively island in Malaysia, is slowly turning into an idyll. Seniors and young children enjoy the slow pace of life. Where are the young adults? They are building a future on the mainland, departing from the sea and the village nest.

"I have two homes - Pulau Ketam and in Klang. I love life on the island - the serenity, the food, and I get to catch up with old friends. However, my family is in Klang. My son does not even visit Pulau Ketam often. So I took up the commitment to travel by boat back and forth. It is tiring, still, I have my responsibilities as the village chief of Pulau Ketam. I have to be there to serve my people, but I also get to go back to Klang to be with my loved ones. I do this willingly." [Mr. Chua]

Erina (2010) has mentioned that older adults dominate the fisheries sector and that youth participation is necessary to continue preserving the transfer of knowledge to the next generation, which will promote a sustainable supply of fisheries resources and their conservation. In the Malaysian

context, the figures support this with statistics released by LKIM showing that the highest percentage of fishers are between 41-64 years old (59.4%). Despite that, the Malaysian youth would much prefer working jobs that offer immediate, lucrative income, expansive job opportunities, and prospects, or at the very least, working in sectors that are less arduous. In the small-scale fisheries sector, low earnings often go hand in hand with laborious work. The minority of youth who are still interested in the industry also give up on switching careers because of the limited effectiveness of government initiative policies to improve fishers' livelihood and socio-economy.

Rahman (2022) has quoted that even though small-scale fishers in Malaysia compose the majority of professional fishers, their current capacity and strength are only able to bring home the least catch, earn the least income, and garner the least subsidies. It can be supported by the study conducted by Ahmad et al. (2020) from Malaysian Agricultural Research and Development Institute (MARDI) whereby it shows that out of the youth fishers (research participants) only half are satisfied and reciprocate the benefits given such as the Fishermen Living Allowance (ESH), Captured Incentive (IHT), Natural Disaster Allowance, Housing Allowance and the Diesel and Petrol Subsidies while the other half are not satisfied.

"The population in the last decade is approximately 20,000. However, since the young generation of residents was eager to migrate to the mainland, the number dropped significantly, leaving only 8,000 people on the island. Don't you think it is serious?" [Mr. Chua]

"The Diesel and Petrol Subsidies do help me, and yet I still have to cover most of the expenses, such as boat repairs and whatnot. If I am out of the sea for long, I do need to reimburse the excess?" [Mr. Lim].

The lack of youth participation in small-scale fisheries on Pulau Ketam has created a workforce shortage. Many sought foreign workers to do the job. Mr. Chua has also mentioned that the island is slowly shifting its focus to tourism. The residents have refurbished their homes and turned them into

a homestay. When the water rises after 4 pm, the homestay appears to be floating on the water's surface, perfect for many individuals who just want a quick escape from bustling cities and towns, so they can relax and unwind on a budget-friendly trip.

The dissatisfaction is reasonable considering the initiative objectives are for fishers in general. Therefore, the authorities should take immediate action to revise and remodel policies that appeal to youths in terms of better livelihoods.

Conclusion

The peaceful, breathtaking views, the slow-paced village, and the freshest seafood that would appeal to everyone. No wonder Pulau Ketam is a popular getaway and the first place people think of for fishing.

The lessons learnt from this paper are not only just a storytelling about the struggles of fishers. It is about seeing things from a different perspective. Mr. Lim was content with working as a fisher, even though he had spent many years going through trials and triumphs in doing so. Luck is the element that affects a fishers' life in so many ways. "A fisher's luck for a better livelihood depends on the adaptation of the capricious weather to survive.

Another note to add is that the residents understand the value of helping each other. And together, all the fishers on the island work hand in hand to overcome impossibilities and bravely decline defeat. Making sure that no fishers and residents will go home empty-handed and hungry.

"I am considered lucky that I even have a job and food on the table every day. If not, then I will be jobless for life!" [Mr. Lim]

"Try seeing the good in the bad. It will eventually work out". [Mr. Chua]

No matter how, the world is ever-changing, and so are humans. There will be barriers and challenges in preserving and promoting unique traditions, owing to the fact that many small, culturally rich communities intertwine

with modern influences and global trends (Abdulaali et al., 2022). It is a hard fact that small-scale fishing is not just an occupation, but also an identity, an ancestral heritage, and the face of Pulau Ketam. The realization that the children of fishers are torn between striving for a bright future and continuing the cycle is in vain.

“Malaysia may have no more fish by 2048 – a mere 2 decades away” – if fishers continue to utilize illegal and destructive methods to fish, a dire warning made by the former Fisheries Department director-general Datuk Ahamad Sabki Mahmood. But most Malaysians appear unfazed. This was taken from a WWF (2012) article titled *‘No more fish to catch in our seas in 35 years?’* Imagine that this crisis was discussed 13 years ago. Fast-forward to now, and the problem remains unsolved; yet, the current worldwide situation is much more distressing.

On the other hand, there is no time to waste in changing the world one step at a time. Active measures must be taken to ensure small-scale fisheries are protected at all costs, and organizational initiatives must be crafted effectively to benefit all fishers and enable them to live a sustainable life, while also increasing youth participation.

Fisheries have been an integral part of the Malaysian economy and our diet. The hope and goal of this chapter is to spread awareness about Malaysian small-scale fisheries, ensuring that we are well-fed and contribute to building our nation. Grit and perseverance are what drive small-scale fisheries around the world to survive and pass on a legacy that inspires all. Raising the voices of small-scale fishing people and transitioning to action, defending the small-scale fishers’ justice. Like all Malaysians, when we think of rice, we think of farmers. The next time there is seafood on the plate, give thanks to our fellow fishers!



Figure 13. Breathtaking scenery of Pulau Ketam, 2024 © J. Lim Zi Enn



Figure 14. The narrow shop lots, 2024. © J Lim Zi Enn

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Entrepreneurial Rise of Housewives in Simpang Empat Conquering Economic Challenges

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Abstract

This case study explores the entrepreneurial journey of a group of housewives in Kampung Baru, Simpang Empat, a rural town in Perlis, Malaysia, who turned economic necessity into an opportunity during the COVID-19 pandemic. Faced with a surplus of fish and an inability to sell their husbands' catch due to Movement Control Order restrictions, the housewives leveraged their culinary skills to create preserved fish products, such as *keropok lekor* (fish crackers) and *belacan* (fermented shrimp paste). The initiative started as a solution to feed their families but soon transformed into a collaborative business venture that supported both their households and the local economy. The study highlights the importance of collabora-

tion, innovation, and community-driven solutions in overcoming socio-economic challenges. It also underscores the significant role of women in rural entrepreneurship, showcasing how their creativity and resilience can lead to sustainable business models and community empowerment.

Introduction

Perlis, Malaysia's smallest state, is located at the northernmost point of the Malay Peninsula, bordered by Thailand to the north and Kedah to the south. Based on data from the Department of Statistics Malaysia (DOSM), the economy of Perlis is heavily reliant on agriculture, with the sector showing a 2.2% increase in 2022 (Department of Statistics Malaysia, 2022). However, the outbreak of the COVID-19 pandemic severely disrupted this traditional economy. The implementation of the Movement Control Order in 2020 restricted fishing activities, and the closure of markets and transportation channels led to a devastating loss of income for local fishers and their families (Waiho et al., 2020). In the face of these economic challenges, a group of housewives from Kampung Baru, Simpang Empat turned necessity into opportunity, transforming their traditional domestic roles into entrepreneurial ventures.

The onset of the pandemic created an economic environment marked by uncertainty and adversity, particularly in fishing-dependent communities like Simpang Empat. With fishing and seafood transportation restricted under the Movement Control Order, many local fishers were left with a surplus of unsold fish. This surplus created a unique problem: while the fish could not be sold or transported to markets, the income loss placed immense strain on households that depended on the fishing industry. For these families, who were already struggling to meet basic needs, the surplus fish became both a challenge and an opportunity. At the same time, the housewives traditionally responsible for managing households, saw a chance to use their culinary skills to address the monotony of meals at home and alleviate some of the financial strain.

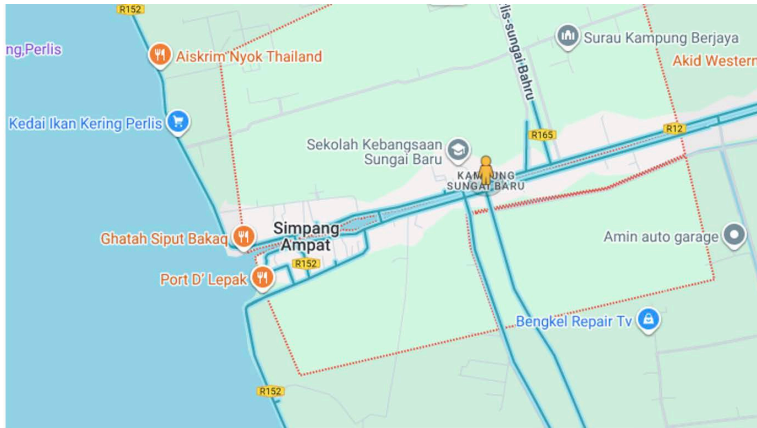


Figure 1. The study location, Kampung Baru, Simbang Empat, Perlis.
Source: Google Maps

As the pandemic continued, what began as a simple solution to diversify family meals soon grew into a more structured entrepreneurial effort. Housewives began experimenting with fish-based products such as fish cakes, dried fish, and other processed seafood items. These products not only provided variety to their families' meals but also allowed the women to generate income by selling their creations within the local community. Over time, their small-scale efforts expanded beyond the household kitchen and into a network of customers within Simbang Empat and nearby areas, helping to mitigate the economic hardship caused by the pandemic.

This study aims to highlight the unstable conditions faced by the small-scale fishers in Kampung Baru, Simbang Empat, Perlis, particularly during the COVID-19 pandemic. Based on onsite interviews with a selected number of fishers in the community, socio-economic constraints and the limiting factors affecting their daily income from fishing were identified. Many of the small-scale fishers in the area experienced unstable income and expressed strong support for stricter regulatory measures to control overfishing and the overcapacity of commercial fishing vessels operating in their fishing grounds. These conditions also influenced the household dynamics, with housewives stepping into entrepreneurial roles to mitigate the economic

challenges faced by their families.

Demographic profile of respondents

Table 1 provides an overview of the housewives involved in the entrepreneurial venture, offering insight into their demographic backgrounds and roles in the business.

Table 1. Profile of housewives in Simpang Empat

Name	Age (years)	Role in the Business	Experience/Skills
Aisyah	35	Household manager, experimented with traditional preservation methods	Managed household, occasionally sold food at the market
Mariam	38	Lead organizer, market sales, production of dried fish products	Experience in market sales, organized production of the preserved products
Faridah	47	Cooking expert, quality control for products	Known for traditional cooking <i>belacan</i> (shrimp sambal)
Siti	34	Packaging and logistics, ensured hygienic packaging	Managed product packaging and distribution logistics
Zainab	28	Recipe innovator, creative development of new products	Developed new recipes as <i>keropok lekor</i> (fish crackers) with cheese, added creativity
Nurul	23	Tech-savvy, managed social media and online orders	Managed online orders, promoted the products via social media platforms

** pseudonyms are used for respondents to protect their confidentiality

The socio-economic landscape of Kampung Baru, Simpang Empat

The entrepreneurial journey of the housewives in Simpang Empat began out of sheer necessity. Like many small, rural communities in Malaysia, Kampung Baru's economy largely depends on local industries like agriculture and fishing. However, the onset of the COVID-19 pandemic forced these communities to confront unexpected challenges. The Movement Control Order restricted local fishing activities, and with seafood unable to reach markets, many families were left with an excess of unsold fish. This disruption to daily life created an urgent need for new ways to support their families.

For the women of Kampung Baru, who traditionally managed household duties and supported their families in more domestic roles, this situation was particularly challenging. Yet, it was also an opportunity for innovation. With the help of some creative thinking and a deep sense of resourcefulness, the housewives of Simpang Empat began to transform their everyday cooking practices into an entrepreneurial venture. What initially started as a way to feed their families using available resources soon turned into a collaborative effort to turn surplus fish into viable products for the local community.

These women, though traditionally focused on domestic tasks, discovered a shared desire to contribute to the family income while solving a pressing problem. Working together, they began experimenting with different methods of preserving the fish, turning it into products such as dried fish, *keropok lekor*, and other local specialties. Over time, their business began to grow, evolving from a small-scale home-based effort to a more structured entrepreneurial venture that reached beyond their immediate community.

A new chapter for rural housewives: From domestic roles to entrepreneurs

The turning point for these housewives came when they faced an oversupply of fish and a declining income due to restrictions on the fishing industry. With limited financial resources and a need to provide for their families, the housewives in Simpang Empat recognized an opportunity to transform their situation. Initially, they focused on using their culinary skills to create meals that would satisfy their families, but soon, this necessity gave rise to something much bigger.

The idea to turn surplus fish into preserved products like *keropok lekor* came from a conversation between the housewives. Aisyah's mother-in-law suggested using traditional fish preservation techniques, such as drying, to extend the fish's shelf life. This idea sparked the beginning of their entrepreneurial venture. Mariam, who had prior market sales experience, saw potential in selling these products. She suggested, *"If we can't sell the fresh fish, why not sell dried or preserved versions? People are always looking for these types of products, and we have the skills to make them."*

This collaboration, initially born out of necessity, quickly evolved into a more structured business. As they experimented with different methods of fish preservation, the housewives started making products that could be sold locally. Their passion for food, combined with the need to generate income, laid the foundation for a small-scale business that could sustain them through the economic hardships of the pandemic.

Value chain and feasibility

The housewives' business was rooted in the principle of using available resources effectively. Their primary raw material were the unsold fish that was provided by their husbands, who had been unable to sell their catch due to the restrictions. The women transformed this raw material into value-added products, such as *keropok lekor* and *belacan*, which could be

stored longer and sold at a profit. The value-added process not only allowed them to preserve resources that would have otherwise gone to waste but also created financial value for their families.

A key factor in their success was their unwavering commitment to quality. Faridah, who was responsible for overseeing the quality of the products, emphasized the importance of maintaining high standards. *“We are making these products for our own families, so quality is important,”* she stated. *“If I wouldn’t serve it to my children, I wouldn’t sell it to anyone else.”* This focus on quality ensured the success of their products in the local market, allowing them to gain loyal customers.

Starting with limited capital, the housewives kept overhead costs low by operating out of their own kitchens. As the business grew, they accessed local government programs that provided financial assistance to micro-entrepreneurs. These programs enabled them to invest in better packaging materials and improve their production capabilities, which in turn allowed them to scale up their operations.

Socio-economic viability and expansion

As their business gained traction, the housewives recognized the importance of reaching beyond their local community to expand their customer base. Mariam, with her market expertise, emphasized the need to think beyond the immediate neighbourhood. *“We have to reach out to more people, not just our neighbours,”* she said. *“There’s demand for these products in other towns, and even in Kuala Lumpur.”*

With the help of Nurul’s digital marketing skills, the group was able to tap into the online market. By promoting their products through social media platforms, they expanded their reach beyond Simpang Empat. This strategic move allowed them to take orders from customers in different regions of Malaysia, further boosting their sales and diversifying their customer base.

Despite the challenges of starting a business with limited resources, the housewives demonstrated resilience and adaptability. Their ability to leverage both traditional cooking skills and modern marketing tools helped

them create a successful business that could support their families and contribute to the local economy.

The key to the success of their entrepreneurial venture was collaboration. Each housewife brought unique skills to the business, which allowed them to divide tasks efficiently and operate smoothly. From production to packaging, marketing, and sales, the housewives worked together, each contributing their strengths to ensure the business's growth.

Aisyah reflected on their journey, saying, *"We didn't start out as business-women. We were just trying to feed our families. But by working together, we've built something that helps us all."* Their collaboration, built on shared experiences and mutual support, allowed them to turn a challenging situation into a sustainable business that benefited not only their families but also the community at large.



Figure 2. Keropok Lekor Cheese made by Aisyah, 2024 © Hemavathi Gunasegaran



Figure 3a & b. Keropok Lekor (Fish crackers) processing in one of the housewives' homes, 2024 © H. Gunasegaran



Figure 4. Packed ready to cook Keropok Lekor (Fish crackers). 2024 © H. Gunasegaran

Conclusion

The entrepreneurial journey of the housewives in Simpang Empat showcases the resilience, creativity, and resourcefulness of women in rural communities when faced with socio-economic challenges. What began as a response to the immediate economic pressures of the COVID-19 pandemic evolved into a sustainable business model that not only helped them support their families but also contributed to the local economy. Their venture, built on surplus fish, traditional preservation methods, and innovative product development, highlights the untapped potential within communities to adapt and thrive under difficult circumstances.

By leveraging their collective skills ranging from culinary expertise to digital marketing, the housewives of Simpang Empat were able to transform a crisis into an opportunity, ultimately building a successful business. Their collaboration, grounded in shared experiences and trust, became the cornerstone of their success, demonstrating the power of collective action in overcoming adversity.

This case study also emphasizes the broader socio-economic impact of micro-entrepreneurship in rural areas. It highlights the importance of community-driven solutions to economic challenges and underscores the need for targeted support for micro-entrepreneurs, especially women, who play a pivotal role in sustaining their households. As demonstrated by the housewives' entrepreneurial efforts, innovation, collaboration, and a commitment to quality can turn economic necessity into long-term success, benefiting not only their families but also their community as a whole.

Ultimately, their story serves as a powerful reminder of the importance of resilience and adaptation in the face of adversity, showing that with the right mindset and support, even the most challenging situations can be transformed into opportunities for growth and empowerment.

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Of Knots and Winds

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Introduction

This is a story about my journey living in and around the marine parks of Terengganu, Malaysia and the fisherfolk I have met along the way. Even though I have lived in and around the islands of the east coast of Peninsular Malaysia since 2007, it always fascinates me when I sit down and talk with the elders. They always have something new to teach. I lived predominantly on the islands in the Perhentian Islands Marine Park, moving between a resort on Besar, which means big in Malaysian language, to the village on Kecil, which means small in Malaysian. One thing that has fascinated me the most is that these fishers are the best at tying knots and use the winds to not only tell the direction and strength of the waves but also the future weather in general. They are the people of knots and winds. Are these skills being lost in the youth?

In March 2024, I conducted structured interviews to gather local ecological knowledge about the sea turtles of Redang, a marine park 50 km south of the Perhentian Islands marine park. The people, culture, legal structure,

fauna and flora are pretty much the same, but they are so different. I met the village head who was also the head of the co-operative for the ice cube making factory, Rocky. A very handsome, talkative man and his family made very good burgers, even for breakfast. We spoke for over an hour as he was sharing with me his stories of how the village in Redang had developed. We spoke a bit in Bahasa Malaysia (Malay) but his English was far better than my Malay so we conversed mainly in English. He shared mostly how the people and villages had changed overtime. In the 1950's the village was located at Kalong Bay to the eastern side of the main island where 50-100 people used to live. Some were Malay but the majority were originally thought to be Indonesian from the Bugis people. They were all fishers and would use the islands as their base whilst others would use it as a place to temporarily rest. They then moved slightly to the south, to the teardrop off the main Redang Island, which is now known as Pinang Island. Pinang is the Malay word for betel nut and the Bugis people found and planted betel nut palms there. You can still find these beautiful palms there today, with their lipstick red ripe fruits. Betel nut is chewed and is a light stimulant. In 1976 the government built them new houses on stilts above the water in the estuary at the southern tip of the main Redang island. This area was completely sheltered from the effects of the strong northeastern monsoon.

In the 1980's Rocky was a young man and used to fish with his friends from the village. They would fish near shore and sometimes go out for 2 to 3 days depending on the weather. Not large boats, but small ones, squid jigging. At this point, there were no resorts and tourism wasn't a thing – they were still people of the sea. They would catch fish but also collect turtle eggs from the beaches at night under a koperasi (cooperative society). One person could collect the eggs each night, there were around 30 people involved in the koperasi and they wouldn't steal each other's eggs. The main sea turtles nesting were *Chelonia mydas*, or Green Turtles and *Eretmochelys imbricata*, Hawksbill turtles. At night there would be up to 80 nests per beach at Chagar Hutang, Mat Simpan and Mat Kepit. Sea turtles nested all over the islands but with the vast majority to the west and north at these three main rookeries. These rookeries are still the main nesting sites in the

marine park. The mass tourism boom that started in the 1960's in Europe came to Terengganu in the late 1980's. Rocky said there were always the odd one or two travellers going to the village but when I asked him what was the first resort he smiled and looked up and pointed towards the large resort on top of the hill on the western side of the Redang estuary, Redang Island Resort. The Resort was built in 1986 and signalled a rapid change in the people's lives. Tourism then boomed with the second resort, Laguna Redang Island Resort, being built in 1990. At this point the islands were still not a marine park. Quarterly to most, the Redang islands were declared the first marine protected area in Malaysia in 1983 under the Fisheries Act 1963, which meant that fishing was prohibited around the islands. The act was repealed after the establishment of the Fisheries Act 1985 when 21 other islands were also declared as Fisheries Prohibited Areas (FPA). However, Redang was only made an official Marine Park in 1994 via the Establishment of Malaysian Marine Parks order 1994, when a total of 37 islands were declared marine parks. The Fisheries department and its co-operatives tried to help the local fisherfolk by sinking Fish Aggregating Devices on the boundary of the marine park in the hope of providing more sustainable fishing grounds outside of the marine parks and via promoting tourism, generating an alternative source of income for these people.

Rocky said the early years of tourism were good but not all were involved. It really boomed for Redang in 2000 when the Hong Kong movie 'Summer Holiday' which was shot in Redang was released. It made Redang famous not just locally but regionally, and even to this day, Hong Kongers flock to Redang to take their photo with the iconic Summer Holiday house near to Laguna. As tourism developed and the village grew the government replaced the water village with the houses built inland which is where the village stands today, in the heart of Redang island. The government has built a school, medical facilities and Berjaya has even built an airport servicing Singapore and Kuala Lumpur.

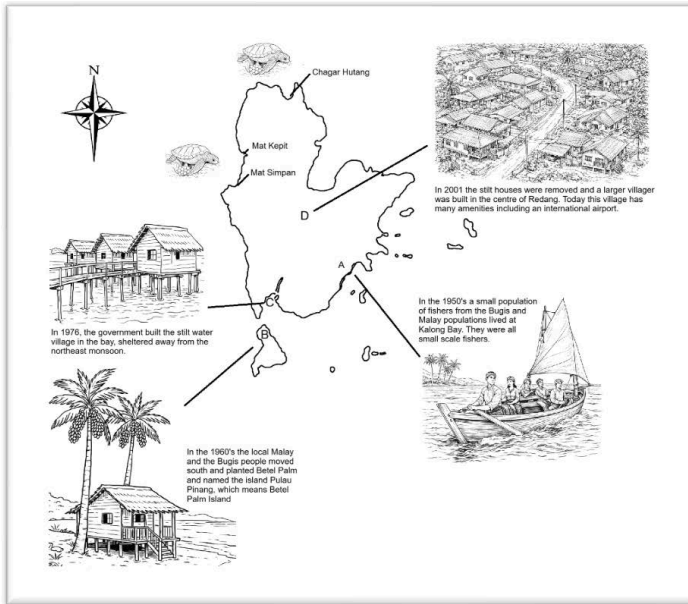


Figure 1. An annotated map of how the village has shifted on the Redang Islands since the 1950's . Designed by author

In February 2005 the Terengganu State Government declared 5 beaches as turtle sanctuaries and prohibited egg collection from Chagar Hutang, Mat Simpan, Mat Kepit, Pasir Bujang and Che Keling. This ended the use of the turtle egg co-operative, but the Department of Fisheries did employ some of the villagers to help protect the beaches whilst University Malaysia Terengganu who were given guardianship of Chagar Hutang and also employed local rangers.

As the years went on Redang has essentially stayed the same with only 14 resorts still operating on the island, not including village-based chalets/homestays. The majority of the resorts are to the south and east of the islands on long beach and leave the entire north and west to nature; this is thought to be one of the reasons why green turtle nests are increasing again.

Rocky confirmed that he is happy with the development of tourism and

confirms what the studies have said that the quality of life of the people of Redang has increased because of tourism (Ghani et al., 2011). In 2024, snorkel guides could make over RM 800 a day doing snorkel tours, which is half the monthly minimum wage. The people of the island have it good, they have low overheads and a tourism industry that is booming, and the marketing is very easy. This story of fishers-to-snorkel guide is actually mirrored on other islands such as the nearby Perhentian Islands where I started my journey.

What is also interesting is that as time passes and tourism has developed, with their livelihoods improved, the youth have started to change. They are starting to see things differently. In Perhentian we have the youth group, Anak Pulau, and in Redang there is a similar youth conservation group called Redang Marine Conservation Group (RMCG). Anak Pulau and RMCG are being pushed by social enterprise Fuze Ecoteer and NGO Reef Check Malaysia, but it's really the interest of the youth that is pushing things forward. It's really interesting to see how the mindset is changing similarly on these islands and the realization of the youth that they have something great around them, but they must look after their reefs. The skills their ancestors once had to tie knots and judge the wind, even though they have technology, are still strong. Instead of tying ropes for the anchors on the boats they are now tying knots to secure research equipment to track sea turtles or judge the wind to estimate where a ghost net has drifted from, or too. These people really are 'of Knots and Winds'.

A special thanks goes out to the interesting people I have sat down with and had a chat. All those teh tariks and burger from Rocky, smiles from Pok Din, and looks of aspiration from many who watch me try and tie my hydrophone to the boat – I can see them thinking, get out of the way city boy. Thank you to my sponsor Yayasan Sime Darby for funding my research, my wife Aida and children, Arianna and Harris for allowing me to go away, and to Prof. Gazi who is leading led the To Big To Ignore Malaysia team.

Thanks also to you, the reader, for reading my story. I hope you now understand the island people of Terengganu better and can admire them for who they are. They may have an iPhone but their heart still belongs to the

sea. Of knots and winds.

Women Entrepreneurship as a Livelihood Opportunity for Small Scale Fisheries in Perhentian Marine Park

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Background

A few decades ago, the small-scale fishing business on Perhentian Island was thriving. It was mostly concentrated in coastal regions, characterized by fishers using small fishing boats with low engine power and traditional gear. Both men and women participated in different aspects of the trade: while men typically went out to sea for fishing, women played essential roles in processing and selling the catch. Considering the history of women in non-working communities, like in many traditional societies, their roles and activities were primarily centered around household and community responsibilities. Women played a central role in ensuring the well-being of their families, raising children, providing emotional and physical support to their families, and were involved in community affairs like social gatherings.

They were primarily responsible for domestic chores which include cooking, cleaning, and maintaining the daily routines of their homes.

Fishers in Perhentian Island are not permitted to fish in the marine protected areas since late 1990s. Fishing was their main livelihood source, and as a consequence, both men and women in their household explored the alternative source of employment. At the same time, the government promoted tourism activities at Perhentian Island, providing options for men and women to work in tourism activities.

In recent years, there has been a noticeable shift on the Perhentian Island as women have gotten more involved in the tourism business. Both genders have contributed to the family's well-being and livelihood, with women on Perhentian Island increasing their production and earning potential as entrepreneurs. Women have grasped new opportunities and expanded their presence in various aspects of the industry. The transformation has resulted in substantial improvements, empowering women while also contributing to the growth of the local economy and community. This study has explored how the women engaged in tourism entrepreneurship in Perhentian Island, with a specific focus on identifying the factors affecting changes in women entrepreneurship through the opportunities, challenges, and strategies that they encountered to sustain the livelihood.

Women entrepreneurship

According to studies, women are the category of entrepreneurship that is expanding the quickest internationally, and they are increasingly playing an ever expanding role in the national economy. Sultana (2006) acknowledges that without women's engagement in the country's development sectors, no progress can be made. In today's global economy, women's engagement is critical in reducing poverty, playing an active role in the economy, and contributing to GDP. In a nutshell, women's engagement leads to transforming a society's whole economy.

The main attributes of entrepreneurship have been identified as risk taking, innovation (Schumpeter & Backhaus, 2003) and identifying opportunities

(Drazin 1985; Drucker 2014). Women entrepreneurs are those who develop new businesses via innovation, the sharing of risks, and the creation of jobs for women together with other women. However, the economic, social, religious, cultural, and psychological aspects present in their immediate communities have a significant impact on the number of women entrepreneurs in society. In Malaysia's circumstance, women entrepreneurs have a crucial role in assisting Malaysia's vision of becoming a well-developed country with a competitive, dynamic and robust economy.

Women empowerment, income, and employment

In the early days, the mindset of the community more often valued women for their reproductive role in society rather than their productive role. As a result, women had little spare time and restricted mobility. Furthermore, this reduced the women's chances for gaining financial, social, physical and human capitals.

Two different motives, 'Push' and 'Pull' factors, (Gilad & Levine, 1986) are identified for women entrepreneurs (Kirkwood, 2009). 'Pull' factors are driven internally (intention to contribute for the good of society) whereas 'Push' factors are driven by external factors (financial instability or low job satisfaction) (Tambunan, 2015; Yitshaki & Kropp, 2016).

The literature revealed that empowerment creates a sense of identity and positive outcomes for individuals (Arshad et al., 2021). An example would be, when a leader feels a sense of accountability to meet their personal needs, which in turn leads to advantages for the organization as a whole. Under the social identity theory, women entrepreneurs feel psychologically empowered when their presence is being recognized and appreciated (Prati & Zani, 2013; Arshad et al. 2021). Women experience empowerment when female entrepreneurs feel a sense of pride and confidence because of the acknowledgement they receive from tourists who appreciate the distinctiveness of the community's natural resources and culture.

On numerous occasions, women often seek flexibility to effectively juggle work and family responsibilities. Consequently, women often establish

businesses with the intention of empowering themselves. The perception surrounding women's involvement in business is evolving due to their active societal participation, unemployment rates, and financial instability within households. Several factors contribute to motivating women as small-scale entrepreneurs, such as the desire to enhance household income, facing life-threatening circumstances, and receiving support from their families, especially their husbands. These factors are likely to increase household income and take over the husband's duties when the husband is carrying on other economic activities (Nor Aini & Faridah, 1991). As women entrepreneurs gain financial independence, they become less dependent on their partners for economic assistance, allowing them to afford essential needs such as food, education for their children, and healthcare more easily. Women typically prioritize their families when it comes to allocating their income, so an increase in income enables women entrepreneurs and their families to experience improved levels of comfort and well-being.

Furthermore, it is crucial for women entrepreneurs to save and invest to generate sufficient funds for future needs and ensure the long-term viability of their businesses. The impact of women's enterprises extends beyond their personal welfare and extends to their families and communities. These small-scale ventures have a positive influence on the overall household, as well as the well-being of their families and society as whole. Women face challenges in balancing multiple responsibilities, as they are expected to devote significant time to their families while fulfilling their work obligations (Jiane & Kdaed, 2017). Therefore, entrepreneurship is often encouraged among women as it provides them with the flexibility to manage their own schedules. However, the increased time and effort required in some cases can potentially jeopardize the sustainability of women entrepreneurs' livelihoods.

Female entrepreneurs encounter similar obstacles as their male counterparts. However, women confront additional hurdles stemming from societal biases and unfavourable cultural, economic, legal, political, and regulatory environments, leading to unequal access to entrepreneurial opportunities. Women have a lower employment rate than males in many

countries, according to the World Bank's gender statistics database. It is apparent that women are disadvantaged in comparison to men. As a result, if women are not employed, they end up creating employment for themselves to overcome poverty and meet family basic needs that can assist them in achieving social inclusion and empowerment. Push factors are defined as factors urging an individual to start a new business venture due to dissatisfaction in their current form of employment (Cabrera & Mauricio, 2017). Similarly, Ismail (2012) found that pull factors are associated with necessities, such as unemployment, dissatisfaction with current employment and inadequate family income.

Vulnerability context in Perhentian Island

Seasonality

Seasonality is widely acknowledged and often considered problematic across various industries. Despite its importance, the impact of seasonality has been neglected in certain studies focused on tourism. The unique business opportunities created by location and economic development play a vital role in fostering tourism activities and serve as valuable assets for tourism enterprises. Malaysia, particularly on the islands, is known to have visiting seasons for tourism activities. December to February, the region experiences its peak rainfall, while the monsoon season affects the coastline area of Peninsula Malaysia from October to March. As a result, islands are typically closed for tourism activities.

Shocks due to COVID-19

The COVID-19 pandemic affected women entrepreneurs who were engaged in tourism business, such as restaurant, grocery, laundry, souvenirs and handicrafts. The island was closed due to lockdown measure, travel restrictions, and most residents had no access to financial and non-financial support to make their living during the pandemic. Following the outbreak,

the prospects for women's entrepreneurship appeared bleak. Businesses were struggling to maintain productivity amidst the constantly changing and unpredictable circumstances. Small businesses, in particular, bear the brunt of the pandemic's impact and were the least financially resilient.

According to Muhammad et al. (2021), the COVID-19 pandemic has had significant economic consequences, placing women businesses at danger of losing revenue and sales growth. The pandemic has introduced an additional risk for businesses owned by women, particularly those operating in the informal sector. The impact on women business owners in this sector necessitates specific examination, as these enterprises tend to be vulnerable and delicate.

Demographic characteristics of women entrepreneurs

The majority of women on Perhentian Island balance their responsibilities as being both entrepreneurs and housewives. Moreover, during peak seasons, other women support these individuals who juggle dual roles in operating their businesses. The entrepreneurial mindset among women has positively influenced the local economy and tourism on the island through their ownership of businesses. As a result, the tourism and business market on Perhentian Island have experienced growth, leading to significant improvements in the livelihoods and well-being of the local communities.

The ten interviews conducted with women entrepreneurs from Perhentian Island were carried out online using WhatsApp and Google Meet in 2020. These women come from diverse backgrounds, and their businesses reflect this diversity. While some started their businesses independently, others inherited them from their parents, resulting in family-owned enterprises. Among the ten women interviewed, five own and manage restaurants on the island, namely Nurul Fatimah, Rohani Yaacob, Roslina Yaacob, Niknor Fatimah, and Fatimah Ismail. The remaining women operate businesses in various fields, including a cooperative shop, a homestay, a souvenir shop, a tourist agency, and a snorkeling hut. It is worth noting that some of the questions asked during the interviews were not answered by the women

due to reasons such as forgetfulness or the private nature of the information. Additionally, the island experiences a closure during the monsoon season, which means that women entrepreneurs only operate their businesses for approximately 7 to 10 months each year.

Equal distribution of income and resources and its impacts on livelihoods

A key advantage of achieving equal distribution is the ability to alleviate poverty. By ensuring a more balanced allocation of resources and income, women who were previously disadvantaged can gain improved access to fundamental necessities such as food, housing, education and healthcare.

“Yes, even now, I am able to purchase my belongings and necessities myself, I remember that I had to ask financial support from my family members and husband few years back”, said Rohani Yaacob.

Unequal distribution of income and resources can generate social tensions and instability. However, by fostering a more equitable distribution, women may experience reduced levels of social conflict and political unrest. Among the interviewed women, various percentages of their earnings were contributed to the total household income. For instance, four of the interviewees allocated 50% of their earnings to the household income while using the remaining 50% for personal purposes. The majority of the women expressed satisfaction in contributing to their family’s economic well-being. When asking Nor Sofina when she started to build her business she expressed herself: *“My lifestyle has changed a lot, especially as a whole, family economy increases throughout the years we’ve been having this business.”* Additionally, women have indicated that their lifestyles have become more stable, allowing them to engage in a greater number of business activities compared to the past. Moreover, a more equal distribution of income and resources can enhance mobility, enabling women to pursue employment opportunities

that contribute to improving livelihoods on the island. This also implies that women are not only empowering themselves but also creating job opportunities for the local communities.

Some of the women mentioned that they have easy access to the supplies and resources for their business and that they have no problem getting the supplies from mainland. Indeed, this plays a crucial role in growing a business and improving livelihoods, resulting in cost-effectiveness, increased productivity, competitive advantage, etc. Nurul Farah said: *“Supply from land, transport by boat from Bandar Kuala Terengganu, no problem to get supply.”* When resources are readily available, the women can engage better in income-generating activities, which again leads to job creation, increased income and improved standards of living on the island. One of the respondents mentioned that:

“Access to a diverse range of supplies and resources can inspire innovation and creativity. When businesses have easy access to different materials, technologies and expertise, they can experiment with new ideas, develop unique products or services, and stay ahead of market trends. This fosters innovation, attracts customers, and contributes to long-term business success.”

In terms of income, the women entrepreneurs on the island have been running their businesses for a period ranging from five to twenty years. Over the time, they have accumulated significant earnings. The majority of their businesses generate an annual income ranging approximately RM 15,000-40,000. These figures highlight the increased security and stability in their lives compared to before they embarked on their entrepreneurial endeavors. Nor Sofina said: *“Yes, the economy is becoming more stable, same goes to the family financial status.”* It is crucial to acknowledge that attaining complete income and resource equality is difficult and may not be realistic or preferable in real-world scenarios. However, working towards a more equitable distribution can yield significant positive effects on livelihoods and society as a whole.

Wider business opportunities and its impact on livelihoods

During the interview sessions, the majority of the women conveyed their appreciation for the expanding business opportunities they have encountered along their entrepreneurial journeys. Four women in particular, namely Nurul Fatihah, Fatimah Ismail, Nur Fatin, and Nur Fazni, highlighted how these opportunities have fostered a conducive environment for economic growth, job creation, income enhancement, and skill development.

Nur Fatin said: *“The business opportunity has also helped others with providing the job to both men and women”* and Nur Fazni said: *“More business opportunity from the business, which wider the business scope of activity.”*

These opportunities have contributed to the diversification of livelihood options, allowing the women to choose from a range of opportunities to support their well-being and enhance their quality of life. Siti Asmat, the homestay owner stated that, in contrast to the past, *“Residential infrastructure changes drastically after we pursue with our homestay, such as change of furniture once it is damaged or once every 3-5 years, compared to the past.”* She has changed her lifestyle with the aid of her business, and she is able to modify the furnishings around her business with ease. Increased business opportunities often attract investments which leads to improved infrastructure, such as better transportation networks, communication systems, and access to utilities. Nurul Fatihah also mentioned that the *“Business opportunities are wider, now we can promote on social media better than before.”*

Other than that, the women also expressed how happy they are to look into the positive impact of having wider opportunities. Nurul Farah Adilla said: *“Other than looking how my family lifestyle changed for the past few years, it’s also giving others (communities) opportunity in terms of employment generation, that leads to the creation of new jobs for others.”* This contributes not only to the family economy but the overall economic growth and livelihood

improvement of the local communities in Perhentian Island.

Nurul Farah also stated: *“I can help others, especially my other family members in this island as well. Now is easy to go to the mainland and visit the relatives, get supplies compared or the past.”*

Every respondent agreed that women can significantly improve the livelihood in the future, not just in terms of family livelihood but the entire economy development in the future. Nurul Fatimah, Roslina, Rohani, Nor Fatin, and Nurul Fazni earnestly expressed their feelings that they are confident the women entrepreneurs play important role in business life. Two women said:

“Yes, I agree that women entrepreneurs can increase livelihood of my family and others and will also contribute to the improvement of tourist attraction at Pulau Perhentian.”

” Yes, women can help business grow and even change the livelihood, just in a business set up, women like I am, plays part in operating the business, women mindset and knowledge is also important.”

In addition, the women emphasized that they enhanced their skills and capabilities, building upon their existing strengths, in order to meet the demands of their businesses. They identified market gaps and embarked on starting their own ventures, providing distinct products, services, and experiences for tourists. This, in turn, promotes tourism attraction, contributes to economic development, and leads to improvements in livelihoods, resulting in a more stable and comfortable lifestyle.

Furthermore, Niknor said *“Life is getting easier and better for me and my family compared to when we first started the business.”*

Business disruptions and its impact on livelihoods

The women shared their challenges during the COVID-19 pandemic in 2020 and highlighted the significant impact it had on the island and their livelihoods. Nurul Fatimah said, *“It’s hard, the island had to be closed, cannot operate, no tourist were coming, there was no income because the restaurant is my family’s source of income. Since it’s closed how do you find money? We had to closed the restaurant for around 1.5 years.”* The pandemic’s effects were not limited to the island alone but were felt globally, leading to income loss and restricted access to resources. Two women said:

“It’s really hard because this thing is something that was not expected to happen not only in Malaysia but all over the world. No one came to the island and our business was not carried out until COVID-19 subsided.”

“Island closed, no tourism activity was performed during COVID-19, especially during MCO. We almost had to shut down our business.”

Due to this, as noted by Niknor at the time, numerous businesses, including those owned by women entrepreneurs on the island, faced significant disruptions and closures due to lockdown measures, travel restrictions, and a decrease in demand brought about by the pandemic.

She said: *“During the MCO, the restaurant needs to be closed temporarily, everyone was asked to stay at home. Hence, no business operation.”*

In terms of sustainability, all the interviewed women except Nor Sofina and Siti Asmat were able to resume their business operations once the government lifted the “Movement Control Order”. They said: *“My family and I continued our daily routine and business at the cooperative store.”* and *“Maintained the homestay business, because some locals stay there too for staycation but not for so long.”* However, their businesses were not operating at full

capacity as many potential customers remained hesitant to leave their homes. Some of the women had to devise contingency plans, explore new sources of revenue, and find alternative ways to maintain their livelihoods during the challenging period. These women said:

“My family has durian farm, we sell durian that time, since restaurant is closed.”

“Helping my family keep the business going by catching and selling fish.”

“Made takeaway food for the island resident and sometimes go to land to find part time jobs.”

“Since the island is closed and there is no opportunity to do business, I returned to land to find another job.”

Several women acknowledged experiencing feelings of uncertainty, fear, and apprehension upon initially hearing about the pandemic. Their primary concerns revolved around the potential risk of contracting the virus, the sustainability of their businesses in the future, and how to mitigate their vulnerability during the challenging period. Rohani Yaacob said: *“I personally struggle to sustain the restaurant business going especially during the MCO, and it was hard to get business capital.”* Cash flow emerged as a significant hurdle for businesses amid the pandemic. Factors such as declining revenue, elevated expenses for safety measures, and delayed customer payments contributed to this challenge. Additionally, the well-being and productivity of employees were negatively impacted.

Niknor stated *“It was hard to get customers, sometimes we had to close our restaurant because not just customer, but our workers need to be in isolation etc.”*

In addition to the pandemic, the women highlighted unpredictable weather as another challenge they face. Siti Asmat said: *“Heavy rains, wave will be*

strong and risky to take customer to island". Nurul Fatihah, Roslina, Rohani and Niknor also mentioned about the Monsoon season where they will only be operating their business on a certain number of months. They stated:

"8 Months, Monsoon season close no one go to the island"

"9 to 10 Months, Monsoon season restaurant is close"

"We operate mostly 8-9 months yearly, monsoon close"

"7 to 8 Months yearly, not operating during monsoon"

Rohani said *"I remember that I had to ask for financial support from my family members and husband a few years back."* The women tend to struggle having dual role, of being an entrepreneur and a housewife. Nurul Farah stated that: *"I am the only daughter in the house, my parents expect me to do some house chores as well after working as an entrepreneur."* Roslina, Siti, Fatin, and Fazni agreed to the statement as well, however, it appears that does not actually have an impact on how their business operates for them. Furthermore, they mentioned:

"I am a mother and doing house stuff is normal in my daily routine, doing so will not affect my business."

"My family understands my business and sometimes I do the house chores, but if not, it is also not a problem."

"Taking care of my little one and the house chores in the evening after working, but since COVID-19 I'm always at home so house chores were my only job."

"Doing dishes, taking care of my nieces and nephews, but not always, and it does not affect the operation of my business."

Entrepreneurs must prioritize finding effective approaches to balance household responsibilities with their entrepreneurial endeavors. This may entail

establishing boundaries, prioritizing tasks, seeking assistance, practicing self-care, and cultivating efficient time management skills. Flexibility, resilience, and adaptability are crucial qualities that can assist entrepreneurs in successfully navigating the challenges posed by business disruptions and maintaining a harmonious work-life integration. As Roslina Yaacob said:

“We know how to run business successfully in order to improve our livelihood, the main challenges we face are limited access to capital to set up business, operating the business, and lack of financial knowledge.”

Conclusion

This case study has provided a comprehensive analysis of the topic at hand and has presented significant findings and insights. The study explored the specific aspects, identifying factors affecting changes in entrepreneurship; business opportunities, challenges and barriers faced, and the strategies and experiences of women entrepreneurs in Perhentian Island, including their entrepreneurial journeys, business models, and success stories. The rising participation of women in the tourism sector on Perhentian Island represents a noteworthy transformation in gender dynamics and economic empowerment. Women’s engagement in entrepreneurship and sustainable tourism initiatives is playing a pivotal role in shaping the tourism industry while also reaping the benefits of its growth.

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The Jakun Coastal Fishery in Kuala Rompin: Maintaining Resilience via Capitalization of Livelihood Assets in Adapting to Local Environmental Change

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Figure 1. It is low tide, and Pak Usop, a Jakun fisher from Deraman, has just arrived at the makeshift jetty that his community uses by the Rompin River, after setting up his fish trap, 2022 © Jarina Mohd Jani

Introduction

Orang Asli are the first inhabitants of Peninsular Malaysia. They are categorized into three major groups and 19 subgroups that are linguistically divided into Austro-Asiatic and Austronesian speakers (Kamal & Lim, 2019). They are commonly thought to inhabit the inland forests of our country. However, as recently as the 1990s, 40% of the Orang Asli population were living in lowland and coastal areas (Andaya, 2002). Among them is the Jakun tribe that belongs to the Proto or Aboriginal Malay category. The Jakun represent the second largest Indigenous community in Peninsular Malaysia (JAKOA, 2023). More than 70% of the Jakun live in Rompin district, Pahang.

According to Endicott (2016), the Jakun's economy prior to 1950s consisted of horticulture and trading – unlike the predominantly coastal tribes, i.e., the Orang Kuala, Btsisi (Mah Meri) and Seletar who were also dependent on fishery.

Generally, coastal fishery refers to fishing activities conducted in the

coastal zone, i.e., the interface between the land and the sea that includes river deltas, mangrove swamps, estuaries etc. that are under the influence of tidal and seasonal variations. A short study was carried out from mid-2022 until early 2023 in two sites located in Kuala Rompin district, i.e., Kampung Deraman (Figure 2) and Kampung Kemendul. Its findings, which provide the profile of the Jakun coastal fishers and their operations, highlight the role of coastal fishery as a livelihood adaptation strategy in response to the socio-ecological changes that have impacted the Jakun communities in southeast Pahang.



Figure 2. Map of the two study sites in the state of Pahang, in Peninsular Malaysia. Prepared by Jarina Mohd Jani, 2022

The Jakun community

In the past, the Jakun have been referred to as Orang Ulu, Jacoons and Orang Benua. Traditionally, the Jakun reside in Pahang and Johor but are now represented over a much wider landscape in Peninsular Malaysia due to the nature of employment, marriage, and migration. As a group, they exploited a diverse ecological range in the landscape they occupy – from forest areas, riverine and estuaries to coastal ecological niches. As in the past, contemporary Jakun continue to make dugout canoes or sampan to navigate the rivers in their landscapes although today, many more use fibre-glass boats with an outboard motor. Nowadays, the Jakun can be found engaging in a plethora of economic activities which include farming and (freshwater) fishing as well as foraging for both subsistence and commercial value, and are also much more involved in employment within the wider society as professionals, semi-skilled worker and in the wider labour force in construction, maintenance, etc.

Kampung Deraman

This village, officially listed as Kampung Batu Tiga, is located near the bank of Sungai Rompin. The area was initially known as ‘Permatang’, which refers to a ridge in the Malay language. According to the elders, it was previously covered with lush forests, which attracted many Jakun families to settle there in order to access the various forest products. The Jakun people of Rompin, according to the previous Batin (headman) were originally nomadic people and would constantly move in search of forest harvest, particularly non-timber forest products. They added that these earlier settlements were never formally recognized as a village. The name ‘Batu 3’ was adopted after the construction of the road¹ connecting Mersing to Pekan (circa 1962, see

¹ This refers to T3, the federal road that connects the main cities in the East Coast of Peninsular Malaysia from Johor Bahru, Johor to Rantau Panjang, Kelantan (see JKR, 2015). Completed in 1962, the Kuala Rompin segment was part of the major road development under post-independent Malaya that finally completed the coastal highway.

Suppiah, 2003) because it is located around three miles away from the Kuala Rompin town. The name 'Deraman', on the other hand, was taken from the name of a previous Batin.

According to Rompin JAKOA's unpublished data in 2022, it is the largest coastal Orang Asli settlement in the district, with 776 inhabitants. The village seems well organized, with a mix of modern government-built houses and those built by the community, as well as a few traditional huts. Here, they have built their homes themselves, using mostly local building materials such as Nibong (*O. tigillarius*) for pole and flooring as well as leaves of Nipa palm (*N. fruticans*) for thatch. There is no piped water nor grid-fed electricity supply, but they have dug wells to get water for washing and would go to the village to get piped water for preparing food while small units of solar panels and repurposed car batteries, as well as generators, supply their basic electricity needs. Despite the lack of modern conveniences, this location keeps them closer to their makeshift boat jetty by the river, an even greater advantage for fishers who often need to operate at irregular hours according to the tide and weather conditions.

Kampung Kemendul

The second study site is located by the Sungai Pontian, a few kilometers further away from the main road. The settlement is generally surrounded by oil palm plantations. With only 305 inhabitants, it is a far smaller settlement than Kampung Deraman. According to the elders, the village was established in 1965 by Jakun settlers who originally hailed from Kampung Aman, another settlement that was located at the Sungai Pontian river mouth. According to the elders, they moved and established Kampung Kemendul so that they could set up an agricultural economy, which they were unable to do in their previous settlement due to geographical restraints. The new village was named 'Kemendul' after one of the first settlers of the village. It now consists mainly of government-built homes and a scattering of traditional types of huts. There is piped water and grid-connected electricity supply. However, the settlement does not have many facilities besides a small rather

run-down-looking community hall. There are a few sundry shops and the two boat jetties, also makeshift, are within walking distance from the village. On the opposite bank of the nearby Pontian river, there are a few Malay villages. The settlement is not very far from the Pontian dam, which was built in 1985 as part of the Rompin-Endau Agricultural Development Project with the objective of storing water as well as preventing saltwater intrusion for the benefit of the agricultural projects that were expanding in the area. It has resulted in the creation of Tasik Pontian, reportedly a popular angling destination (see Figure 2).

The Rompin Orang Asli's coastal fishery: A natural capital loss-initiated adaptation

For Orang Asli communities, their natural resources-based livelihood-making landscape is referred to as '*kawasan rayau*', the Malay word that literally translates into 'roaming area'. As practical people, the Jakun do not shift their livelihood-making strategies without necessity. Based on the livelihood trajectories and archival research, a timeline of key events that may have impacted the local environment was established (Figure 3). It is suggested that the Rompin Orang Asli fishers' recent adoption of coastal fishery is an adaptation strategy necessitated by the dramatic physical change and eventual loss of their traditional livelihood-making landscape (i.e., the once extensive peat swamp wetland areas) since the 1980s. The study by Higashi et al. (2012) that highlighted the stark deforestation process in Pahang based on 1966 baseline land use data (compared to its 1996 equivalent) is indicative of the loss of the Jakun's traditional livelihood-making landscape, i.e., freshwater wetland areas that the community consider as their traditional *kawasan rayau* in Rompin. This is corroborated by a more recent study by Othman et al. (2019) that reported the loss of 700 km² of peat swamp since the 1990s. Indeed, by adapting to coastal fishery, they were resiliently responding to a livelihood stressor that was created by the disappearance of their traditional fishing grounds.

Such an adaptation strategy is considered a proactive response, which has better sustainability prospects for local fishery resources (Makwinja et al., 2021). Adaptation, which requires adopting new elements while letting go of those that do not assist in the battle for survival (Razha Rashid, 2001) is an important trait of Orang Asli communities' resilience that helps them buffer against their vulnerability during challenging livelihood circumstances. They have strategically transited from their fragmented traditional freshwater fishery landscape to the healthy coastal option. As mentioned above, this is a proactive adaptation response – a livelihood strategy that contributes towards its sustainability (Chambers & Conway, 1992). Indeed, the water resource of the main rivers of Pahang is the state's key natural capital (Bhuiyan et al., 2014).

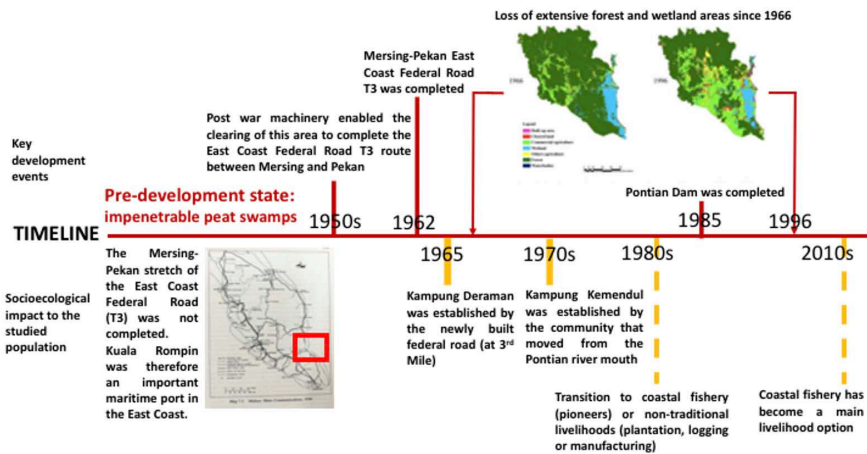


Figure 3. Chronology of Kuala Rompin's key development and socio-ecological impacts based on the Jakun coastal fishers' livelihood trajectory and archival data. Prepared by Jarina Mohd Jani, 2022

In the case of the study population in Rompin, their current fishing-related *kawasan rayau* generally refers to the coastal zone (see Figure 4). For the fishers from Deraman, it includes the area from the midstream of Rompin river (near Leban Condong) until the estuary. On the other hand, the

Kemendul fishers roam mainly from the dam located upstream² of Pontian river until its estuary. Our interviews also recorded that the Deraman fishers do sometimes go further upriver, as far as Tebu Hitam village, whenever their targeted catch is more abundant at these sites. The Kemendul fishers claim that their fishing ground used to extend further upstream. However, their movement is now restricted due to the Pontian dam structure that prevents them from moving further upriver. The barrier was built in 1985 primarily to stop the influx of saline water into the inland areas of the district that had been developed for agriculture (JPS, 2023). It has been commented, particularly by KPB, the expert fisher from Kemendul who participated in the study, that the presence of this physical barrier since 1980s has negatively affected the abundance of the downstream aquatic resources of the Pontian river. The Jakun fishers of Chini Lake had raised similar concern in relation to the changes caused by the dam that was built in their landscape (Parker et al., 2019). According to Jackson and Marbulla (2001), for tropical ecosystems the overall riverine fishery production is reduced by dams when the historical flooding further downstream is compromised. This may be due to the disruption caused to the natural life cycle of aquatic organisms that is regulated by seasonality-influenced hydrology. If we consider their primary aquatic resource, i.e., giant freshwater prawn, KPB's observation is rather poignant. In 1961, Dr. Ling Sher Wen and his team from the Fisheries Research Institute in Penang, Malaysia made a groundbreaking discovery that the larvae of *Macrobrachium rosenbergii* can only survive in brackish water (Banu & Christianus, 2016)³. This reproductive aspect triggers mass downstream migration of spawning adults from their freshwater habitat towards brackish ecosystems near the river mouth. Therefore, the presence of dams creates an artificial barrier to this natural process, resulting in lower recruitment of the wild population. Jackson and Marbulla

² In this chapter, the term 'upstream' refers to the upriver location of the fishing site in reference to the village's fishing jetty, while 'downstream' refers to its downriver location.

³ This was such an important scientific finding for the species' aquaculture development that Dr. Ling was awarded the title of 'Father of Freshwater Prawn Farming' by the World Aquaculture Society (see FAO, 2023).

(2001) elaborately discussed the impact of dams on Malaysian fishery and specifically highlighted that fish populations in undammed rivers continue to thrive unlike those in dammed systems in Terengganu and Perak particularly in the absence of fish ladders.



Figure 4. Rompin Orang Asli coastal fishing range (clockwise from left): Kampung Deraman community's fishing area in Rompin River, Kampung Kemendul community's upstream and downstream fishing area in Pontian River. Prepared by Jarina Mohd Jani, 2022

As the demand for the local aquatic resources soar, concerns on their overharvesting have led to a call in the state parliament to create a sanctuary, particularly for the sought-after giant freshwater prawns of Rompin river to ensure the sustainability of the wild stock (Yusof, 2021). The state however prefers a 'softer approach', due to the lack of a reliable mechanism to enforce control of access. Hence, the above-mentioned in-situ stock enhancement program by the state of Pahang's Department of Fisheries (DOFP) has been

deemed the best ‘first move’. While no data is available for verification on the population status of the wild stock in the Rompin area, the effectiveness of releasing the giant freshwater prawn fries downstream Pontian river for the purpose of stock enhancement could be compromised if the juveniles are not able to migrate upstream towards freshwater ecosystems that serves as their habitat during their adult life cycle. Indeed, sound population data, which resource users can assist to collect, is key in developing effective local fisheries resource management.

Recognizing the importance of grass-root support in ecosystem-based fisheries management, the DOFP had decided to focus on the local Orang Asli fishers to be their partner in the conservation of local fisheries resources (Yusof, 2022). All the fishers involved in this short-term study were recruited as participants of the DOFP project and they provided assistance to the agency in identifying suitable sites for releasing the giant freshwater prawn and mud crab juvenile. The move could be considered strategic, as Orang Aslis traditional right to their ‘customary waters’ has been recently defended by the court (Wook, 2021). It is therefore a recognized, hence important natural capital for Orang Asli’s livelihood and a potentially powerful tool for protecting key fisheries areas. However, the boundary of their customary waters is unclear. Therefore, the current fishing area is their *kawasan rayau* perhaps only in a practical sense. The Jakun fishers appear to understand this and often insist on the concept of good common use of the rivers where they operate whenever the topic of local fisheries area management was brought up. Nonetheless, they could still be DOF’s strategic partners in conservation, where grass-root participatory platforms such as *MyKomuniti Perikanan* (MyKP), which concept is to support local fishing communities that carry out fisheries resource management activities including agritourism and recreational fishing, can be used to formalize their involvement.

Human capitals: Jakun coastal fishers' 'must haves' in adapting to ecosystem changes

Information related to human capitals in Table 1 highlights Jakun's coastal fishers importance in adapting to new ways of fishing. As earlier mentioned in the Kemendul village's background, the community had shifted from their former village to Kemendul with hope of gaining better farming opportunities. This economic profile is more conventional for the Jakun community (Masron et al., 2013). Fishing was likely not a natural choice when they first moved there. Their fishing experts, namely KPB and KPR, are not originally from the village but had a family tradition in fishery outside of Rompin, which they continued in Kemendul: KPB ventured into giant freshwater prawn fishery as practiced in Endau by his father before they moved there, while KPR began fishing for mud crab in Sungai Pontian as he did back in Pekan before moving to Kemendul. In addition, our analysis of the three eldest fishers' livelihood trajectories suggests that Kemendul could be the first Jakun giant freshwater prawn fishery site in Kuala Rompin, initiated by KPB's father. It only became a new local tradition when KPB, now the eldest fisher in Kemendul, carried on the practice. DMB, the eldest Deraman fisher, also claimed to have learned the *empang* technique – the most efficient way to catch this resource – from a relative in Kemendul. This would explain why, in terms of fishing experience, even the youngest Kemendul fisher has more years in practicing giant freshwater prawn fishing than most of the younger Deraman fishers. This is because for the rookie Jakun fishers in Kemendul, not only did they readily have access to intergenerational knowledge transfer from their pioneering elders, but it was also already a viable economic option when they began making a living a decade ago.

Our findings further suggest that the eldest fishers who had always relied on fishing could be the Orang Asli pioneers in coastal fishery in Rompin district. The contemporariness of the Rompin coastal fishery needs to be highlighted as this finding is much unlike earlier documentations on the

aquatic resource use by the Jakun communities from inland areas that had demonstrated mainly the traditional aspect of their freshwater fishery⁴ (Gill et al., 2009; Omar et al., 2011; Kamal & Lim, 2019). KPB and DMB are regarded as the local fishing experts for having first introduced giant freshwater prawn fishery a few decades ago in their respective Orang Asli villages. Today, giant freshwater prawn is the most iconic product for the Rompin district (PDR, 2018). According to these elder fishers, the price of a kilogram of giant freshwater prawn for example has escalated from just around RM 10 per kilogram in the 1980s to at least RM 60 per kilogram today. The other targeted resources, i.e., mud crab (*Scylla sp.*), marble goby (*Oxyeleotris marmorata*) and arc clams (*Meretrix meretrix*) also fetch a good price in the market today, making coastal fishery a preferred livelihood option for the Jakun fishers. As for KPR from Kemendul who exclusively targets mud crabs, he is a highly esteemed expert in Kuala Rompin and he explained that when he began commercial mud crab fishing about thirty years ago, competition for the resource did not exist. It has remained the case till this day for mud crabs where no other fisher professed to focus on mud crabs besides him.

⁴ Fisheries that occur in peat swamp forests are categorized as freshwater fishery as well.

Table 1. Profile of participating Rompin Orang Asli fishers

Village	Name	Origin*	Age	Fishing experience (Years)	Previous occupation (sector)	Targeted resources	Fishing methods
Deraman	PR	Deraman	47	5	Manufacturing (steel works)	Prawn, mudcrabs	Kait, Jaring, Empang
	PU	Belangkap	57	5	Logging, commercial fishery	Prawn, mudcrabs, kepah	Kait, Jaring, Empang, gleaning
	PB	Belangkap	54	3	Logging	Prawn, mudcrabs, kepah	Kait, Jaring, Empang, Cakar
	MB#	Deraman	60+	40+	None	Prawn, mudcrabs	Kait, bintor, Empang
Kemendul	PBH#	Endau (Johor)	50+	40+	None	Prawn	Jaring, Empang
	MM	Banting (Selangor)	30+	10+	Construction, lorry driver, etc.	Prawn	Jaring, Empang
	JJ	Kemendul	29	10+	Construction, oil palm plantation,	Prawn	Jala, Jaring, Empang
	PRN#	Pekan (Pahang)	52	40+ (30+ in Kemendul)	None	Mud crab	Bintor, Kait

* For those originally from outside of Kuala Rompin, their district and state of origin are stated.

Fishers who have been acknowledged as experts by their fellow fishers.

For optimizing their fishing operations, the Jakun fishers of Rompin capitalize on their human capital, in the form of their physical fitness, labour, knowledge and skills in making suitable strategies to achieve the desired livelihood outcomes. This emphasis on their 'haves' is a characteristic that livelihood researchers argue to be an indication of resilience (Bernstein, 1992, Scoones, 2015). To aptly adapt, they leveraged on their human capital, i.e. physical fitness and labour as well as their fundamental knowledge of fish and fishing to assist them in acquiring the required techniques for exploiting the new *kawasan rayau* quickly.

Making do and making anew: Jakun coastal fishers' practical and innovative strategies in facing physical capitals limitations

Physical capital homogeneity among artisanal fishers could contribute towards reducing conflict in the sector as it would indicate a relatively equal share of harvest (Bose & AlMasroori, 2020). However, presently this physical capital is not the Jakun fishers' best livelihood asset. As fishery is not a socio-economic activity affiliated to the Orang Asli, only land-based farming schemes have been provided to them (Syed Husain et al., 2017). Our review on the status of the Jakun fishers' physical capitals found that proper jetty infrastructure was absent at both study sites (see Figure 1 and Figure 5) although plans were reportedly under way to change this. Furthermore, their fishing boats were small, with low engine power, and often old – all purchased second-hand as they could not afford new ones. Due to these factors, they voluntarily make do by restricting when and where they fish, mainly to ensure safety. Compared to the non-Orang Asli local fishers who appeared to access better jetties, better fishing vessels and gears, the Jakun fishers may not be catching as much as the latter due to the physical capital induced limitation. However, due to the strong emphasis on communal harmony among Orang Asli communities (Parker et al., 2019), conflict between the two groups have not occurred although they openly expressed hope to gain access to the same fishery based physical assistance enjoyed by the local Malay fishers whom they recognize to have a longer coastal fishery tradition.



Figure 5. The make-shift jetty at Kemendul, Kuala Rompin, 2022 © Mohd Hariez Pishal

Empang (staked enclosure) – the most efficient method of catching giant freshwater prawn is a technique that they had learned from their local Malay fisher’s friends (see Figure 6). This fishing technique was indeed mentioned in Hamilton’s 1925 publication of Malay words. Interestingly, the Seletar Orang Asli communities in Johor have also been reported to use the *empang* as a traditional gear: in the Johor estuary (Chong & Sasekumar, 2002) and in Pulaui estuary (Ahmad & Isa, 2014; Hashim & Suratman, 2020). This method, however, could potentially be destructive as they indiscriminately catch juvenile aquatic resources that would then result in growth overfishing, particularly in mangrove areas (see Chong & Sasekumar, 2002). Due to the important role of the mangrove ecosystems in harbouring the spawning and juvenile population of many commercial species of fish, growth and recruitment overfishing is a trend that poses the biggest threat to the sustainability of mangrove fishery in the region (Chong, 2006). During our participatory fieldwork of the *empang* technique at both the Rompin and Pontian rivers, we noticed only a small fraction of trapped juvenile specimens. It may be possible that the mesh size of the net used by our

research participants were larger than those observed during the study the authors conducted in the Johor estuary. While this needs further verification, the 'right' size of the mesh, including for those used to make crab traps, was a point that was always brought up by the Jakun fishers as a necessity when discussing sustainable fishery. They even asked for information on the suitable size for their catch and all agreed that if the authorities would impose a larger mesh size for their existing fishery, they would happily oblige. Indeed, the introduction of a minimum legal size (MLS) is lauded as an effective way to curb this problem (see Mohamed et al., 2014 for an extensive list of MLS for various commercial tropical fish species), while the most practical management approach to ensure MLS in countries where enforcement could be challenging such as Malaysia is perhaps through a larger mesh size requirement (Ben-Hasan et al., 2021).



Figure 6. Main fishing gears used by the Jakun of Kuala Rompin (clockwise from top left): *Empang*, *Bintor*, *Kait*, *Jala* and *Jaring*, 2022 © M. H. Pishal

It must be emphasized that traditionally, Jakun fishing gears are made from naturally sourced materials. Therefore, they only willingly invest in physical

capitals such as the extensive nets required for *empang* fishing when they are sure of its higher return. This also applies in mud crab fishery, where KPR from Kemendul who exclusively targets mud now fully relies on the commercially available modern crab traps (see Figure 6), although he is adept at making and using the traditional crab trap, *bintor*. Technically, this is because the traditional method is only labour cost-effective when the resource is abundant, which he claims is no longer the case today. Similarly, the willingness to make this physical capital investment is because he is able to improve the efficiency of the modern traps by applying the traditional Jakun knowledge of making traps and understanding of the mud crab species' behaviour. He and the other fishers of Deraman who target mud crabs also use the traditional *kait* (bent iron rod) method, a low cost and maintenance tool that is used to directly extract larger sized mud crabs from their burrows. However, they insisted that this method is potentially destructive when applied by unskilled crab fishers who are prone to destroying the burrows, a critical habitat for the mature mud crab population. Besides protecting burrows, the Jakun mud crab fishers claim to be selective with their catch, which are voluntarily released if the individuals weigh approximately less than 300 g. This good fishing practice is commendable and should be acknowledged because the absence of catch size regulation for mud crabs often leads to overharvesting, as the smaller individuals get sold as recruitment for aquaculture while the biggest are sold to premium markets in the region (Le Vay, 2001).

Besides those mentioned above, Figure 6 presents other common fishing gears that are used by the Jakun coastal fishers, namely *jaring* (drift net) and, *jala* (throw net). Another popular device is the *gelugoh*, a traditional Jakun device that has benefited from their ingenuity in innovation, resulting in hybrid versions that are either a combination of natural and artificial, usually plastic materials or fully artificial, as presented in Figure 7. In addition, other completely new inventions that have been created by them were also discovered. Interestingly, all were made by upcycling plastic and other materials they 'fished' out of the river, such as the *bubu ikan ubi*, a specialized marble-goby trap made of plastic barrels and old fishing

nets, the plastic *serkap* that conveniently helps to catch larger demersal fish in the estuary during low-tides, their ingenious *lukah* (freshwater fish trap) inspired anti-otter device made from old nets and plastic or iron frames. Even the most enterprising among them, PB makes concession to only use his clam rake during high tide to ensure that he doesn't damage the clam bed. Turning the local river's plastic waste to physical capital wealth and voluntarily restraining from destructive practices, they profess a quiet, voluntary pro-ecological stance that is consistent with the sustainable practices of their Jakun brethren of Lake Chini (Omar et al., 2011). The current practice of these unsung eco-warriors indicates that on the when it comes to sustainability, there is indeed much to learn from this Indigenous community whose culturally embedded ecological stewardship remains intact to this day.



Figure 7. Jakun fishing innovations (clockwise from top left): Side and top view of a *gelugoh* made of natural and artificial materials; deployment of a fully (plastic) artificial *gelugoh*; anti-otter device; *serkap*; *cakar* (clam rake) and *bubu ikan ubi* (marble goby trap), 2022 © M. H. Pishal (top row) & J. M. Jani (bottom row)

Conclusion

Considered one of the most 'mainstream' Orang Asli communities in Malaysia, the Jakun communities have not commonly been associated with fishery. However, this chapter describes, perhaps for the first time, the Jakun community's participation in coastal fishery. It adds to the existing literature on their traditional freshwater fishery, suggesting that this economic sector in general does form an important part in this Indigenous community's diverse livelihood strategy. It also highlights the cultural aspects of this Indigenous fishing community that contribute positively to their coastal fishery-based livelihood-making, which was a proactive response to the disappearance of their traditional fishing grounds in freshwater ecosystems. While it is important to highlight the vulnerability that such natural capital loss has imposed on the Jakun community, the chapter also emphasized that the struggles must not erase the evidence of their livelihood resilience. This has been clearly demonstrated by their strategic capitalization on the livelihood asset that they readily have, i.e., the coastal ecosystem which was originally not their main natural capital and their human capitals which were aptly deployed to ensure a smooth adaptation despite their low physical capital status. The Jakun coastal fishery pioneers who had already began fishing when environmental changes began to take place in the 1980s gradually transited from their traditional fishing practice in an increasingly fragmented freshwater ecosystems to fishing instead in intertidal zones of the district's main rivers, i.e., Sg Rompin and Sg Pontian, targeting a variety of aquatic resources that now have high market value. They however had to do away with their existing traditional equipment that were efficient in the swamps and small rivers but not in the intertidal coastal ecosystem where the new resources can be more abundantly captured. Therefore, they had to first learn the basics of this new fishery and then adjust their own traditional freshwater fishing skills and knowledge, particularly in gear-making, to suit their new fishing enterprise. Despite being 'new operators' in the coastal zone, sound local ecological knowledge related to the area has been accumulated, benefiting their fishing operations. Their local ecological

knowledge, coupled with the sustainable fishing traditions that they continue to practice, could be of great use in collaborative management of the local fisheries resources.

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Empowering Coastal Small-Scale Fishing Communities in Sabah

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Background

Small-scale fisheries provide significant advantages to society, such as ensuring economic stability and growth, food and nutrition security and protecting against extreme poverty and vulnerability. Most small-scale fishers are self-employed and typically consume their catch directly within their own household or community. The fishing operations they engage in provide income that contributes to the local economies. Intense fishing activity poses a significant risk to the restoration of fish populations, while the use of explosive and cyanide fishing methods harm marine ecology. Continuous negative impacts will have repercussions on the coastal fish stock, hence impacting the livelihoods of coastal communities and food

security. Therefore, the Small-Scale Fisheries Project (SSFP) is being conducted to establish sustainable fisheries management in Banggi Island and Larapan Island. Banggi Island is situated in the Kudat district, which is part of the Tun Mustapha Park (TMP) in the northern region of Sabah. On the other hand, Larapan Island is situated in the Semporna Priority Conservation Area (PCA), located in the southeast region of Sabah. The selection of both islands as the first SSFP sites was based on the significance of small-scale fishing to the local populations, as well as the challenges and issues that need to be addressed. The conflict for resources between small and large-scale fishers in these areas leads to overfishing or destructive fishing methods, which have a severe impact on fisheries resources and the livelihoods of communities. The primary objective of SSFP is to facilitate the implementation of a sustainable management system for small-scale fisheries. This approach involves active participation from the fishing community to achieve fish stock recovery and minimize environmental harm. By doing so, SSFP aims to enhance the livelihood and resilience of the community. This project focuses on 5 specific criteria: 1) societal inclusion and participation, 2) good governance, 3) utilization and conservation of fish stock, 4) improved livelihood and community resilience, and 5) mitigation or reduction of environmental impacts. Communities actively engage in the activities outlined in the community management plan, taking charge of their own areas and resources. They identify and implement alternative livelihoods, which ultimately empowers them to become leaders in environmental co-management.

Introduction

Small-scale fisheries play a fundamental role in the coastal villages of Sabah, providing significant benefits not only to the local people but also to society at large. These fisheries have a crucial role in maintaining economic stability and promoting growth, while also providing assistance for food security. Additionally, they serve as a protective measure against extreme poverty and vulnerability. In Sabah, the majority of small-scale fishers work as self-

employed individuals and typically consume their harvest within their own houses or local communities. This approach not only ensures their families' financial well-being but also substantially contributes to the local economy by generating income and supporting associated companies.

Small-scale fisheries in Sabah face significant challenges that jeopardize their long-term viability and, consequently, the welfare of coastal communities. Overfishing, often driven by urgent economic demands, adversely affects fish populations by hindering their long-term recovery and survival. Overfishing can lead to the extinction of endangered species, disrupting marine ecosystems and jeopardizing the long-term sustainability of fisheries.

Moreover, in Sabah, there have been many cases reported on the usage of destructive fishing methods such as fish bombing and cyanide fishing. These methods are not only rapidly destroying marine life, but they also adversely affect coral reefs and other vital marine ecosystems in the long run, which disrupt the equilibrium of the marine ecosystem, resulting in diminished fish populations.

Fish populations are in decline, necessitating that fishers allocate increased time and money to obtain fewer fish. This indicates that they earn less income and encounter more challenges in supporting their families. Moreover, the depletion of fish stocks presents a significant threat to food security, as fish provide the primary source of sustenance for coastal populations. The decline in marine biodiversity adversely affects the cultural heritage and traditional knowledge of fishing communities, which are vital to their existence. Consequently, populations dependent on these fish sources face difficulties in securing livelihoods and sustaining their enterprises.

To effectively tackle the issues confronting small-scale fisheries in Sabah, a comprehensive strategy must be executed that harmonizes economic development with essential environmental sustainability. Consequently, the Small-Scale Fisheries Project (SSFP) was pioneered and implemented by WWF-Malaysia to address these issues. This article presents two case studies on the implementation of SSFP in Banggi Island, Kudat, situated within Tun Mustapha Park, and Larapan Island in Semporna. This case study focuses on the initiation and implementation of SSFP in several areas,

addressing issues and challenges, as well as the implications on biodiversity, economy, and society.

What is Small-Scale Fisheries Project (SSFP)?

The Small-Scale Fisheries Project (SSFP) is designed to enable a sustainable small-scale fishery management where the fishing community participates in good governance to meet fish stock recovery and reduce environmental impacts that improves community livelihood and resilience (Hilmi et al., 2022). Banggi Island, located in the Kudat district of northern Sabah, is a component of the Tun Mustapha Park (TMP), which is distinguished by its diverse marine ecosystems. In contrast, Larapan Island is situated within the Semporna Priority Conservation Area (PCA) in southeastern Sabah, which is another critical area for conservation efforts (Figure 1).

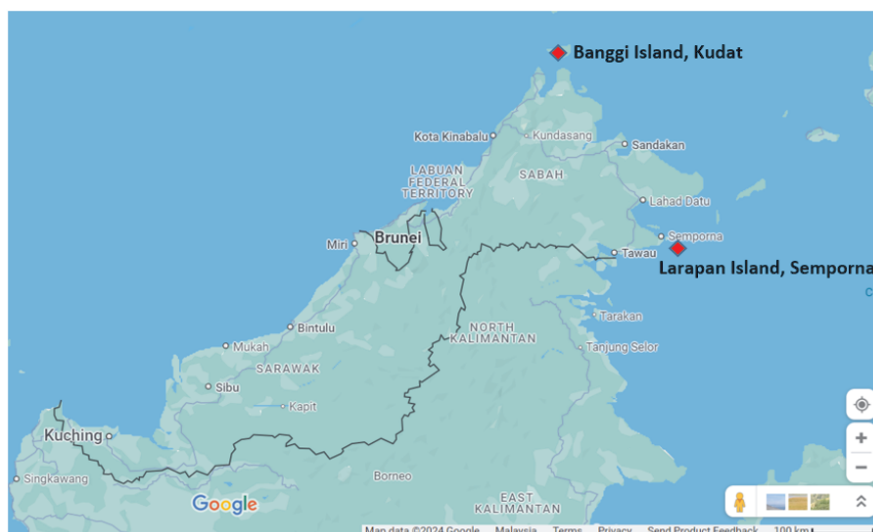


Figure 1. Locations of SSFP sites in Sabah (Adapted from Google Maps)

The SSFP was initially established on these islands due to the substantial

dependence of local communities on small-scale fisheries and the urgent challenges they encounter, including competition with large-scale fisheries, which results in exploitation and also the use of destructive fishing methods. These practices not only endanger marine biodiversity but also jeopardize the livelihoods of those who rely on these resources.

The primary goal of the SSFP is to establish a management system that is both sustainable and resilient for small-scale fisheries. This necessitates the active involvement of the local fishery communities in order to mitigate environmental degradation and restore fish stocks. The SSFP endeavours to enhance the resilience of local residents against economic and environmental challenges and improve the quality of life by engaging the community. The initiative is guided by five specific criteria (Figure 2): 1) ensuring the inclusive participation of all community members, 2) promoting transparent and accountable governance, 3) optimizing the sustainable use of fish resources, 4) improving community well-being and resilience, and 5) minimizing the negative environmental impacts of fishing activities. This community-based management approach empowers residents to actively engage in the activities identified in the community management plan, thereby enabling them to take ownership of their marine territories and resources. This empowerment empowers them to identify and cultivate alternative livelihoods, thereby promoting a culture of sustainable practices and fostering leadership positions in the co-management of the environment.

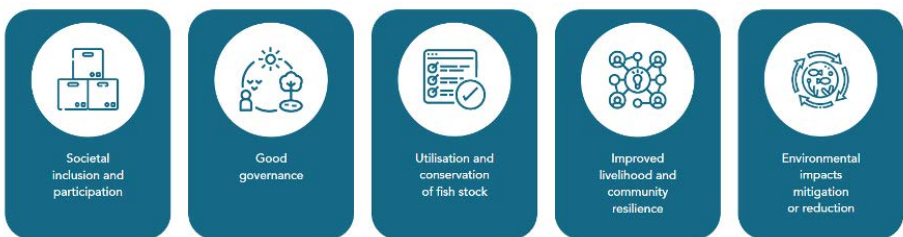


Figure 2. Criteria of Small-Scale Fisheries Project (SSFP)

Case study 1: SSFP in Banggi Island, Kudat Sabah

Banggi Island is situated in the northern Sabah, adjacent to Marudu Bay. The island is a sub-district of Kudat, located one hour away by boat. Banggi Island is the largest island in Malaysia, encompassing an area of 440.7 km². The estimated population of the island is 20,000 individuals (Department of Statistics, 2010). The primary residents are the Ubian, Suluk, Kegayan, Bajau and the Indigenous Bonggi tribes. The majority of the population of Banggi Island is employed as fishers, farmers, plantation workers, or engaged in ship building.

A scoping study was done from 2018 to 2021 using several surveys to gather information on fisheries, historical data, and associated concerns and difficulties, hence enhancing scope and understanding of Banggi Island area (Raymie, 2021). Data on fish landings, fishing grounds, fishing gear, vessels, fish prices, fishing seasons, and fishing techniques are collected to comprehend the fisheries of Banggi Island. Taking into account aspects like as transportation accessibility, potential community participants, awareness levels, and other considerations, Kampung Perpaduan, Kampung Karakit, and Kampung Lok Tohog are proposed as suitable locations for the SSFP in Tun Mustapha Park. Kampung Perpaduan has been designated as a site for the implementation of the SSFP owing to its function as a nexus for small-scale fishers, its strategic position for fish commerce on Banggi Island adjacent to the Karakit jetty, and its active conservation initiatives, rendering it an exemplary candidate for the advancement of sustainable fisheries practices.

Seven public consultations were conducted to develop a Community Management Plan for the SSFP in Kampung Perpaduan, Banggi Island. The main objectives of these consultations were to gather fisheries information specific to Kampung Perpaduan, discuss the issues and challenges faced by small-scale fishers, introduce the details of the SSFP concept, and plan the next steps for its implementation. In the final consultation held in December 2022, the majority of the Kampung Perpaduan community agreed on the management plan, leading to the initiation of an association known

as Persatuan Perikanan Kampung Perpaduan, or simply 4P. The primary objective of this association is to oversee the progress and development of SSFP in Kampung Perpaduan and to facilitate decision-making related to the project. A socialization meeting of the SSFP was held and endorsed by Sabah Parks and the Department of Fisheries Sabah.

In the implementation of the SSFP in Kampung Perpaduan, several trainings were conducted in 2023 with the participation of 4P members and community. An alternative livelihood workshop was held to identify suitable options based on the community's existing resources and capabilities. As a result, two alternative livelihoods were identified: wet and dry noodle making for housewives and fish cage farming for heads of households. Trainings for both selected livelihoods were conducted and actively participated in by the Kampung Perpaduan community. Additionally, the community participated in other trainings and study visits to support the SSFP implementation, including Financial Management training, an Honorary Warden Course, a Community Empowerment Leadership Camp, and a visit to Derawan, Indonesia.

Moving forward to 2024, the first SSFP Annual Grand Meeting was held, featuring several key agendas (Figure 3). These included a sharing session by community members who participated in the training, as well as updates from WWF-Malaysia on the status of fish bombing, sea turtles, coral reefs, and fish populations. During the meeting, a committee for 4P was formed, and there was a review of the community management action plan, along with updates on the status of alternative livelihoods for both housewives and heads of households.

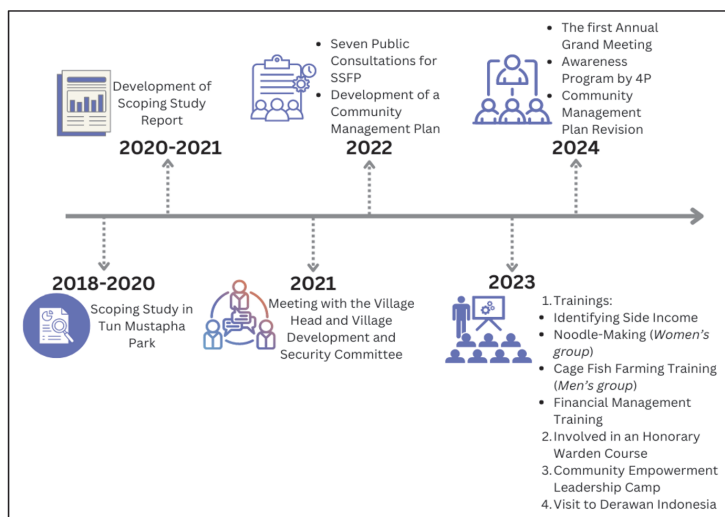


Figure 3. Timeline of SSFP in Banggi Island, Kudat Sabah

Issues and challenges in Banggi Island

The communities of Kampung Perpaduan have raised serious concerns about the encroachment of commercial fishing into areas reserved for small-scale fishers. Commercial fishers, particularly those using purse seines, have frequently violated the one-nautical-mile zone designated for small-scale fishing. This encroachment significantly reduces the catch available to local fishers, directly affecting their income and livelihoods.

Additionally, the communities have observed a decline in fish populations, which is exacerbated by illegal fishing practices such as fish bombing and cyanide use. The presence of commercial fishers in these areas is also seen as a contributing factor to the depletion of fish stocks, leading to increased competition between small-scale and commercial fishers for valuable fish species.

Moreover, the degradation of fishing habitats has further limited the space available for small-scale fishers to carry out their activities. The village head has pointed out that fish habitats are deteriorating, likely due to harmful

practices like trawling and the use of illegal fishing methods. This has sparked significant interest among the local fishers in restoring coral reefs and improving fish habitats to support sustainable fishing.

The community leader is also aware of the limited alternative income opportunities for fishers, which adds to the coastal communities' concerns. There is a growing recognition of the need to develop other livelihood options to reduce their dependence on natural resources as the primary source of income.

Positive impacts through key activities in Banggi Island

Biodiversity impacts

Patrolling activities and coral reef restoration efforts in the fishing grounds have played a key role in improving fish habitats, curbing illegal fishing, and preventing sea turtle poaching. As part of these conservation initiatives, 700 coral frames have been deployed around Maliangin Island, a crucial fishing ground for the community, to support the restoration of the reefs. In June 2024, fishers from Kampung Perpaduan began participating in a trial project focused on the catch and release of sharks and rays. Through their involvement, fishers have gained a deeper understanding of the essential role sharks and rays play in the ecosystem. This awareness led to the voluntary release of a shark caught in their net after the project's first meeting, demonstrating their commitment to conservation. So far, eight volunteers from the fishing community have expressed interest in joining the project.

In addition, baseline data for fisheries stock has been established, and the community actively monitors species composition. Trained community researchers, equipped with tablets, use the Survey123 app to collect daily fish catch data. This simple and accessible method ensures the community can easily contribute. The data collected is used to calculate Catch Per Unit Effort (CPUE), which provides insights into the health of fish stocks in the area. On Banggi Island, where data collection has been ongoing since 2020,

CPUE has increased from 2.66 kg/hour to 16.04 kg/hour between January and July 2024, indicating a positive trend in fish stock recovery.



Figure 4. Training of daily fish catch data with enumerator using Survey123
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Economic impacts

The implementation of alternative livelihood projects in Kampung Perpaduan has had significant positive economic impacts by providing new income sources for both fishers and their families. Through capacity-building initiatives, active fishers have gained skills in fish cage aquaculture, which complements their traditional fishing activities and provides a more stable income, especially during off-peak fishing seasons. Meanwhile, their spouses, who received training in making wet and dry noodles, have launched small businesses, further increasing household income and economic resilience within the community.

These alternative livelihood projects have given community members valuable new skills, allowing them to diversify their sources of income and reduce their dependence on traditional fishing. This shift is particularly important as overfishing and environmental degradation have made conventional fishing increasingly unsustainable. By adopting this dual approach of

expanding fishing practices and creating new entrepreneurial opportunities, the community has strengthened its financial stability and improved overall well-being, lessening its reliance on the fishing industry.



Figure 5. The wives joined capacity building on wet and dry noodle making in 2023 © Raymie / WWF-Malaysia

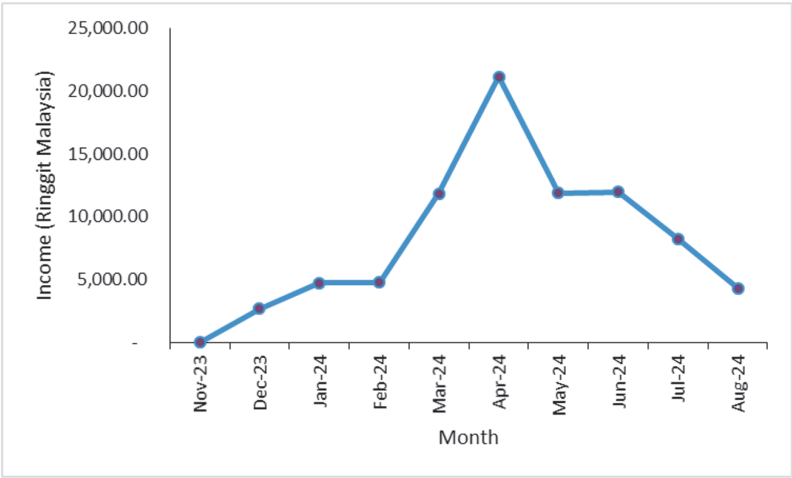


Figure 6. Increase of 2,000 % in the first 6 months of operation. Slight reduction because of the less demand which may be caused by fewer festivals or family kenduri or reunions from May 2024 to August 2024.

Source: WWF Malaysia, 2026

Social impacts

Kampung Perpaduan's involvement in developing a Community Management Plan (CMP) and area-based governance has had a profound impact on the community, transforming how they interact with their environment, economy, and governance (Figure 7). The CMP has empowered the community to take an active role in managing their natural resources, fostering a strong sense of ownership and responsibility. This participatory approach has brought the community closer together, encouraging collaboration among diverse groups, including local leaders, fishers, women, and youth. By actively participating in the CMP process, community members have been able to voice their concerns, share local knowledge, and contribute to decision-making, creating a stronger sense of unity and collective identity.

One of the most significant social impacts of the CMP is the enhancement of social unity. The collaborative process has brought together individuals from different social backgrounds, strengthening relationships and mutual understanding. The involvement of women in developing the plan, especially in identifying alternative livelihoods, has also elevated their role in the community, challenging traditional gender roles and promoting greater gender equality. By ensuring that women, youth, and marginalized groups are included, the CMP has created a more inclusive environment where everyone's perspectives are valued.

Additionally, the community's participation in developing a business model canvas as part of the CMP has led to economic empowerment and social innovation. This approach has encouraged creative and entrepreneurial thinking, helping the community discover sustainable, culturally appropriate, and locally relevant income-generating opportunities.



Figure 7. Involvement of the communities in governance of their area including meeting with government agency, development of community management plan, business model canvas development and establishment of association. © Christna / WWF-Malaysia

Case study 2: Small-Scale Fisheries Project in Larapan Island, Semporna Sabah

Larapan Island is one of the islands located in the Semporna district, covering an area approximately 160,000 hectares and divided into two villages, namely Kampung Larapan Hujung and Kampung Larapan Tengah with a population of 1,300. The marine area of the island is rich in marine biodiversity and habitats such as coral reefs and seagrass beds, which are the primary habitats for most marine species.

The majority of the island's inhabitants rely entirely on fishing as the primary source of income. However, fishing activities have impacted the marine ecosystem of Larapan Island, even though most fishers operate on a small scale. This is because the uncontrolled exploitation of marine resources, especially from commercial fishing, has affected the income and catch yield of small-scale fishers. This situation has also led to an increase

in fishing activities among small-scale fishers to meet their daily needs and income.

Therefore, the SSFP was introduced on Larapan Island to establish a Community Management Plan (CMP) for the community on this island. The fishing community participates in governance to restore fish stocks and reduce the environmental impact of fishing activities. SSFP assists in management and is a pragmatic approach to addressing issues related to small-scale fisheries.

The SSFP in Larapan Island began with research done throughout the years 2020-2021 (Figure 8). The fishing community provided robust support for this initiative, actively participating in all conducted activities. Pre-assessment data and consultations with fishers identified challenges and enhancement strategies for small-scale fisheries, aiding in the formulation of a draft management plan for the community (Mohd Fadzliee, 2021). The CMP was subsequently approved by the community leader and the Department of Fisheries Sabah, Semporna branch. Currently, SSFP is in the implementation phase outlined in the Community Management Plan. This management plan will assist the community in overseeing its marine resources to promote sustainable and enduring fisheries. On the next page are the 4 major phases of SSFP implementation in Larapan Island:



Figure 8. The timeline of SSFP in Larapan Island, Semporna

Issues and challenges in Larapan Island

The fisheries of Larapan Island, Semporna, face significant challenges, particularly from illegal, unreported, and unregulated (IUU) fishing, bycatch, and damage to the marine ecosystem. One of the biggest concerns is the frequent use of destructive methods like fish bombing and cyanide fishing. These practices have severely damaged coral reefs, especially in areas like Timbun Mata, which are crucial for the island's small-scale fishers.

Another issue is bycatch, where protected species such as the Oceanic Whitetip Shark and Smooth Hammerhead Shark are accidentally caught, often without regard for their size or conservation status. This problem is made worse by the community's lack of awareness about the protection of

these species under Malaysia's Fisheries Act 1985.

Fish stock depletion is another major concern. Overfishing by commercial vessels, which often ignore local regulations, has drastically reduced the fish available to small-scale fishers. As a result, local fishers are forced to work harder and catch juvenile fish, further endangering the sustainability of marine resources. These problems not only put the marine ecosystem at risk but also threaten the livelihoods of the coastal communities that depend on it.

Positive impacts through key activities of Larapan Island SSFP

Biodiversity impacts

The marine patrol efforts on Larapan Island, Semporna, play a vital role in monitoring local resources, significantly benefiting both biodiversity and the livelihoods of the local people. Led by local youth and supported by initiatives like WWF-Malaysia's Anti Fish Bombing campaign, these patrols focus on tackling IUU fishing practices that threaten the region's marine environment. By addressing destructive fishing methods and preventing encroachment by outside fishers, these patrols serve as a key defense for the island's marine ecosystem. Through their constant monitoring, they help protect the biodiversity of the area and ensure the long-term sustainability of local fisheries, which are crucial for the community's well-being.

Ecologically, the impact of these patrols is significant. By reducing illegal fishing and protecting habitats from damage, they promote the recovery of fish populations and other marine species. Coral reefs and seagrass beds, now shielded from harmful activities, offer diverse habitats for marine life, leading to healthier fish populations and greater biodiversity. As the ecosystem recovers, the area becomes more resilient, benefiting both the environment and the local community that depends on it.



Figure 9. Patrolling activity in Larapan Island © Mazidi Ghani / WWF-Malaysia

Economic impacts

The introduction of a trial small-scale, community-based sea cucumber farming on Larapan Island has had a positive impact on the local fishing community's economy (Figure 10). By cultivating *Holothuria scabra*, commonly known as sandfish, the community now has a sustainable alternative source of income that requires little maintenance. As fish populations have declined due to overfishing and environmental damage, this sandfish farming initiative helps locals reduce their reliance on traditional fishing. It allows them to diversify their income, offering greater financial stability and helping protect their livelihoods for the future.



Figure 10. Trial of the small-scale sea cucumber farming in Larapan Island
© Mazidi Ghani / WWF-Malaysia

In addition, the marine patrols play a crucial role in supporting the economic well-being of the local fisheries, which are vital for the community's income and food supply. By helping fish populations recover and thrive, these patrols ensure the long-term sustainability of the fisheries, providing the community with a steady source of income and food security. The community's efforts to manage its fisheries through marine patrols highlight how local stewardship can boost both economic and environmental sustainability, benefiting both the people and the environment they depend on.

Social impacts

Education and awareness programs, combined with the community's active role in forming the SSFP Committee, have greatly influenced life on Larapan Island. These efforts have helped the residents understand the importance of managing resources sustainably, encouraging them to take a more proactive role in protecting both their livelihoods and the environment. Through these initiatives, the community has learned about sustainable fishing, environmental protection, and the long-term benefits of preserving marine resources. Various groups, including fishers, youth, and women have been included, ensuring everyone has the knowledge to participate in sustainable practices.

The formation of the SSFP Committee has played a key role in bringing the community together and creating a structure for local leadership and decision-making. This has allowed for more inclusive discussions on fisheries management, resource conservation, and alternative livelihoods. Previously marginalized groups, such as women and youth, are now actively involved in decision-making, contributing to more comprehensive solutions.

Community consultations and discussions have further strengthened participation on the island, offering a space for people to voice concerns, share ideas, and help shape sustainable fisheries management plans. This collaborative approach has fostered trust and a shared sense of responsibility, increasing the community's commitment to conservation efforts. These initiatives have strengthened the community's ability to handle challenges such as environmental changes, declining fish stocks, and economic hardships. By actively engaging in the creation of the SSFP Committee and participating in educational programs, the people of Larapan Island are better prepared to face future difficulties and find sustainable solutions that benefit both their environment and their livelihoods. This involvement has also fostered a sense of pride in their local culture and traditions, especially those tied to small-scale fishing, helping to preserve their way of life while promoting sustainability and environmental care. These efforts have left a lasting impact by improving education, encouraging participation, and building resilience and unity within the community.



Figure 11. SSFP activities with the community © WWF-Malaysia

Conclusion

In conclusion, the Small-Scale Fisheries Programme (SSFP) has brought significant positive changes to the coastal communities in Banggi Island and Larapan Island, helping them build stronger economies, protect their environment, and come together as a community. By teaching fishers sustainable practices and providing alternative ways to earn a living, the SSFP has reduced their dependence on traditional fishing, which has faced challenges like overfishing and damaged habitats.

Additionally, the SSFP has played a key role in restoring the marine environment, with efforts like coral reef restoration and improving fish habitats boosting biodiversity and securing the future of the local fisheries. This sense of teamwork between community members, local leaders, and outside organizations has instilled pride in their conservation efforts. Ultimately, the SSFP has not only improved the community's livelihoods but has also encouraged a more sustainable and inclusive way of managing

their precious marine resources for the future.

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Tukun Tukun or Unjam-Unjam – Do Artificial Reefs Improve Livelihoods of Small-Scale Fishers in Malaysia?

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Introduction

Artificial reefs are used as effective tools to increase the productivity of fish biomass. In Malaysia, the marine fisheries resources have declined considerably over the past decade primarily due to overfishing particularly by using trawls. Commercial fishing gears, i.e. trawl nets and purse seines are prohibited from fishing in Zone A (0-5 nautical miles) to reduce fishing effort. This area is reserved for the artisanal fishers using traditional fishing gears. Artificial reefs are now increasingly being recognized as an important aspect of fisheries management and conservation.

In Malaysia, the government has undertaken an artificial reefs development program over the last three decades with the main objective of improving the economic conditions of artisanal fishing communities. Various floating objects have been used as aggregating devices for fish called *unjam* in the east coast of Peninsular Malaysia since the early 1900s (Hung, 1988). Artisanal fishers have established *unjams* close to the coast to attract small pelagic fish (Anderson & Gates, 1997). The Department of Fisheries (DOF) and the Fisheries Development Authority Malaysia (LKIM) have introduced artificial reefs in various locations in the coastal waters since 1987.

Recently the structural designs and materials of artificial reefs have been changed. The main purpose of establishing artificial reefs is to protect marine habitats from trawls and to compensate for the effects of stock depletion. There is a growing need for the conservation of fisheries resources to enhance the productivity of the fish biomass and to rehabilitate marine habitats to improve the income of artisanal fishers (Islam et al., 2009). The LKIM managed artificial reefs are used as fish aggregating devices (FADs) and mainly focus on increasing the productivity of fish biomass in the surrounding waters and thereby increasing accessibility to the resources, catches and incomes of the artisanal fishers.

The economic literature on artificial reefs has provided limited empirical evidence on the socio-economic benefits to fishers (Crowder et al., 2000). Evidence shows that artificial reefs contribute positive effects on the economy of the local communities, however, the contributions of artificial reefs management to fisheries resources and livelihoods of poor fishers have not been studied in Malaysia. Previous research in Malaysia mainly focused on the type of artificial reefs in terms of the design of the modules, how they are placed and the materials used. Study results from Indonesia and the Philippines indicate that fishers can increase income from fish catches as a result of FADs. This paper examines on how the FADs can contribute income for the local fishing communities in Malaysia.

Artificial reefs and FADs in Malaysia

The Department of Fisheries Malaysia (DOFM) and the Fisheries Development Authority Malaysia (FDAM) introduced an artificial reef (AR) program in 1975. A variety of modules and designs of ARs had been deployed in Terengganu. The main objective of ARs deployed by DOFM was to protect inshore fisheries habitat from trawlers and enhance the fisheries resource, while the Fisheries Development Authority installed ARs in six districts of Terengganu State in Malaysia (Table 1).

Table 1. Number of ARs deployed by DOFM and FDAM by district in Terengganu, Malaysia

District	Department of Fisheries	Fisheries Development Authority of Malaysia	Total
Besut	2	13	15
Setiu	2	56	58
Kuala Terengganu	10	70	80
Marang	2	27	29
Dungun	4	18	22
Kemaman	4	30	34
All	24	214	238

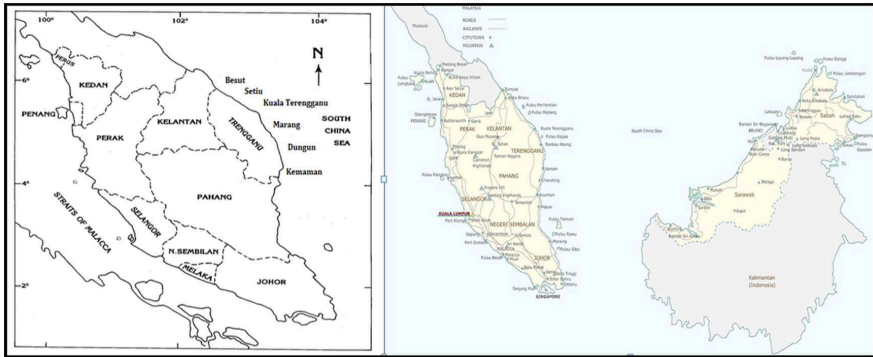


Figure 1. Map of Peninsular Malaysia showing the location of Terengganu State. Source: Google Earth

The objective of this paper is to examine the economic benefits of artificial reefs (ARs) to artisanal fishers in Terengganu State, on the east coast of Peninsular Malaysia (Figure 1).

Fisheries in Terengganu

There are approximately 7,400 (67%) artisanal fishers in Terengganu registered with the Department of Fisheries (SEAFDEC/MFRDMD, Terengganu, Malaysia, personal communication). Fishers rely mostly on fishing for their livelihood, with limited access to other employment. There are three fishing seasons, the main season (March to October), the shrimp season (November to January) and the squid season (May to July). The majority of fishers use small fiber glass boats (locally called sampan), which are fitted with average 25 horse power outboard engines. A variety of fishing gears are used, such as hand lines, long lines, traps, gill nets and drift nets. There are four islands in the north of Terengganu; 6 – 20 km from the shore and three islands in the south; 10 – 15 km from the shore. They travel relatively far from the shore (about 10 km) to fish around coral reefs and target high value demersal and pelagic species.

The main fish landing comprise Indian mackerels (*Rastrelliger* spp.), round

scad (*Decapterus* spp.), sardines (*Sardinella* spp. and *Dussumieria* spp.), hardtail scad (*Megalaspis cordyla*), threadfin bream (*Nemipterus* spp.), and jewfish/croaker (*Pennahia* spp., *Johnius* spp. and *Otolithes* spp.) In the AR area the important fish species are yellowtail scad (*Atule mate*), shrimp scad (*Alapes djedaba*), trevally (*Carangaooides* spp), *Caranx sexfasciatus*, big eye snapper (*Lutjanus lutjanus*), brown stripe snapper (*Lutjanus vitta*) and brown barred grouper (*Cephalopholis boenack*) (Ahmad et al. 2012).

The study was conducted to evaluate the economic impact of ARs in the selected areas in the East Coast, Peninsular Malaysia. The data for this study were obtained from interviews with 300 artisanal fishers from six districts in Terengganu using a structured questionnaire.

Results and discussions

The average age of respondents was 50 years, while 24% of the fishers were more than 60 years old. The majority of the heads of households had attained primary education (58%), while 30% had attained secondary level education. The average size of fishing household was 5.34. A quarter of the total sample had a large household size (7-12 members). Majority of the fishers were engaged in fishing for an average 30 years.

Fishing locations

On average, fishers visited three fishing locations throughout the year. Fishers used relatively large boats with engines of 35 horsepower, while other fishers used the lowest engine capacity (18 horsepower). Drift nets and gill nets were found to be the main gear for the artisanal fishers. About 62% of total sampled fishers used multiple fishing gears (e.g. drift nets and hook and line), while 22% of fishers used only drift nets and rest of them (16%) used only hook and lines.

Fishing income

Comparisons were made between fishers' income from fishing around AR and non-AR areas. The results of the study showed that about 63% of outboard powered (170 out of 269 fishers) and 40% of the inboard powered vessel (14 out of 35 fishers) operators have carried out fishing activities around the AR area and employed a variety of fishing methods. Both inboard and outboard powered vessels derived less income from AR area compared to non-AR area (Table 2).

The fishers who used multiple types of gear received 28% higher income compared to those who used only one type of gear in both AR areas and non AR areas. The fishers operating in non AR areas used multiple gears and derived significantly higher income (28%) compared to the AR areas (Table 2). The multiple gear, drift net and hook and line users had a similar pattern of behavior regarding time spent travelling and type of site visited: at all distances from shore, the majority of respondents prefer to fish in AR sites. However, fishers using trap gear did not visit AR sites less than an hour from shore and generally made short or long trips. Fishers using trap gears avoid AR sites since drift nets and hook and lines can become entangled in the trap gear. Fishing operational costs and fishing trip time are positively related to income, especially fuel cost which accounts for about 75 percent of the daily fishing cost. The average age is 50 years and approximately 25% of the fishers are more than 60 years old. Although experience is an important asset, the results indicate that the older fishers have somehow become less productive in fisheries.

Table 2. Average monthly fishing income from AR and non-AR areas by using boat, gear and engine horsepower (RM) and trip time.

Fishing method	AR area	Non AR area	Difference (%)	t-statistics
Boat				
Inboard	2,522 (14)	3,943 (21)	36.04	0.9
Outboard	1,956 (170)	2,387 (99)	18.06	2.75
Gear				
Hook & line	1,718 (28)	1,894 (19)	9.29	0.34
Multiple gear*	2,207 (115)	3,060 (68)	27.88	2.12
Drift net	1,582 (39)	2,199(25)	28.06	1.65
Horsepower				
Up to 15 hp	1,706 (95)	1,953 (50)	12.65	0.79
>16 hp	2,312 (89)	3,164 (70)	26.93	2.01
<i>All</i>	1,999 (184)	2,659 (120)	35.06	2.42

**drift /gill net, hook & line, traps*

Note: Numbers of respondents are in bracket

Conclusions

This paper investigated the impact of artificial reefs on the income of artisanal fishers in Terengganu, Malaysia. A direct comparison of fishing in AR and non-AR areas showed that fishers' income was influenced by size of fishing boat, type of gear, engine capacity of boats, and fishing trip time. The results of the study show that the artisanal fishers were able to increase relatively higher income from fishing in non-AR locations compared to the ARs locations in the study area. The majority of the artisanal fishers failed to derive benefits from AR programmes, which suggests that AR programme may not be viable strategy for socio-economic improvement of artisanal fisher households in Malaysia.

More than half of the total artisanal fishers used multiple gears. The majority of artisanal fishers use drift net and travel near shore areas. On the other hand, fishers use multiple gears especially hook and line, spent

relatively higher operational costs for fishing compared to drift net users and could derive relatively higher income from AR areas compared to the drift net users. The existence of multiple gear in the AR areas creates an entanglement problem between fishing gears, especially drift net and hook and line users who target to fish surrounding the AR areas. The potential for multiple gear use in the AR areas need to be addressed for reducing social conflicts and sustainable artisanal fisheries in Malaysia.

The Malaysian government has put emphasis on the fisheries conservation through AR development. Fishing restrictions has been imposed by implementing fisheries zones, limitation of license for fishing boat and gear. However, fisheries resources have been over-exploited due to lack of effective implementation of these fisheries rules. AR cannot support an ever-increasing number of fishers and therefore cannot protect fisheries' resources.

However, the allocation of fishing rights should be considered at the early stage of new AR deployment. Several management options can be explored to achieve sustainable fisheries in Malaysia. The fisheries authorities can decide the implementation strategy for effective management of fisheries through a consensus of fisheries stakeholders. The AR programmes would be promoted through participation of fishers and other fisheries stakeholders. The government should assign the access rights to the fishers for sustainable management of marine fisheries in Malaysia.

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Navigating Socio-Economic Uncertainty of Small-Scale Fishery in Terengganu State, East Coast of Peninsular Malaysia: Impact of Overfishing and IUU Fishing

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Abstract

Small-scale fisheries in Terengganu State play a critical role in supporting coastal livelihoods and local food security within Malaysia's Blue Economy framework. These fisheries provide a primary source of income for coastal communities, particularly those classified under the B40 group – households with monthly earnings below RM 4,850 (approximately USD 1,077) – who largely depend on traditional fishing practices. Despite their socio-economic importance, small-scale fishers face increasing socio-economic uncertainty.

This study highlights that livelihood vulnerability among small-scale fishers is primarily driven by overfishing and illegal, unreported, and

unregulated (IUU) fishing, particularly by commercial trawl vessels using destructive fishing gear. Findings from the interview sessions with fishers in selected coastal villages in Terengganu reveal severe impacts of trawling activities, including declining fish stocks, reduced catch volumes, and unstable incomes. Although climate variability and adverse weather conditions also affect fish resources and fishing operations, fishers perceived IUU fishing as a more immediate and severe threat to their economic sustainability.

These pressures have further weakened intergenerational continuity in the sector, as many fishers are reluctant to encourage younger generations to enter the fishing industry due to its growing uncertainty and lack of long-term livelihood security. From a policy perspective, the findings expose critical gaps in fisheries governance, enforcement, and spatial management. Strengthening regulatory enforcement against IUU fishing, improving monitoring of trawl operations, and enhancing institutional support for small-scale fishers are essential to achieving inclusive and sustainable Blue Economy development. Immediate and coordinated policy interventions are therefore crucial to sustaining small-scale fisheries and securing resilient livelihoods for coastal communities in Malaysia, in line with national fisheries policies and Sustainable Development Goal 14.

Introduction

In 2022, the total population in Malaysia for 2022 has reached 32.9 million, contributing to the increasing demand for fishery resources in Malaysia (Department of Statistics Malaysia, 2022). With increasing number of residents populations, topped with healthy lifestyle and increased in level of education, fish-based food has become the preferred meal option. For the past few years, reduction in fishery resources in Malaysia, especially in coastal and deep-sea fishery resources, has become a major concern (Sin et al., 2019). The fishing sector plays an important part in the Malaysian economy since it provides a source of protein for the people, opportunity for employment, contributing to profit for capitalists, and boosts foreign

exchange through export activities.

Socio-economic uncertainty in small-scale fishing communities is a complex and multifaceted issue, driven by environmental, economic, governance policy, and social factors. The unpredictability of the fish stocks, market fluctuations, rising costs, and competition with larger industrial operations all contribute to the financial and social insecurity of small-scale fishers. This instability often leads to poverty, migration, and disruption of family and community life, making it difficult for these communities to thrive and build sustainable livelihoods.

This study is aimed to highlight the unstable conditions that facing by the small-scale fishers from a fishing village in Terengganu State. Based on the onsite interviews with a selected number of fishers in the fishing village and fishing operation, socio-economic constraints and limiting factors of daily income from fishing were collected. Most of small-scale fishers in the area are faced with unstable income and they expressed strong support for stricter regulatory measures to control overfishing and overcapacity by commercial fishing vessels operating in their fishing grounds.



Figure 1. Interview session with the fishers, Kampung Tok Jembal, 2025 © Authors

Background

Small-scale fisheries in Malaysia

Small-scale fisheries have long played a crucial role in Malaysia's economic, cultural, and social development. The traditional fishing sector has been a vital source of livelihood for coastal communities for centuries, dating back to precolonial times when fishing was one of the main economic activities, especially in rural areas. In the 1960s and 1970s, the government introduced modernization efforts to improve fishing productivity. This included the promotion of motorized boats and the introduction of more efficient fishing gear. However, many small-scale fishers were slow to adopt these technologies due to financial constraints, and traditional fishing practices continued.

Today, small-scale fishers in Malaysia face a number of challenges, including increased competition with industrial fishing operations, fluctuating global fish prices, and the impacts of climate change on marine ecosystems. Government interventions and financial support schemes are being implemented to mitigate these vulnerabilities. From the traditional artisanal practices of precolonial times to the more modernized but still fragile sector of today, small-scale fisheries remain an essential part of the country's socio-economic fabric. However, they are increasingly challenged by environmental changes, modernization pressures, and global market forces.

In Malaysia's coastal fishery, the fishing industry operates in accordance with the zoning system by Department of Fishery, and it is separate from Zone A to Zone C2/C3 in line with the gross registered ton of the fishing vessel. All small vessels with smaller, less engine power are operated in Zone A. Additionally, and all the fishing vessels with which has less than 20 GRT (gross registered ton) are operated in Zone A and are considered as small-scale fishing vessels. According to the data provided from the annual fishery statistics in Malaysia, the number of fishing vessels and fishers operating in zone A vessels are higher than other high-engine powered commercial

fishing vessels. The statistical figure of number of fishers in coastal fishery is shown in Figure 1. The employment and reliability of income source for the small-scale fishers are solely dependent on the fishing industry; and unfortunately, small-scale fishers nowadays are dealing with the unstable income and uncertain conditions.

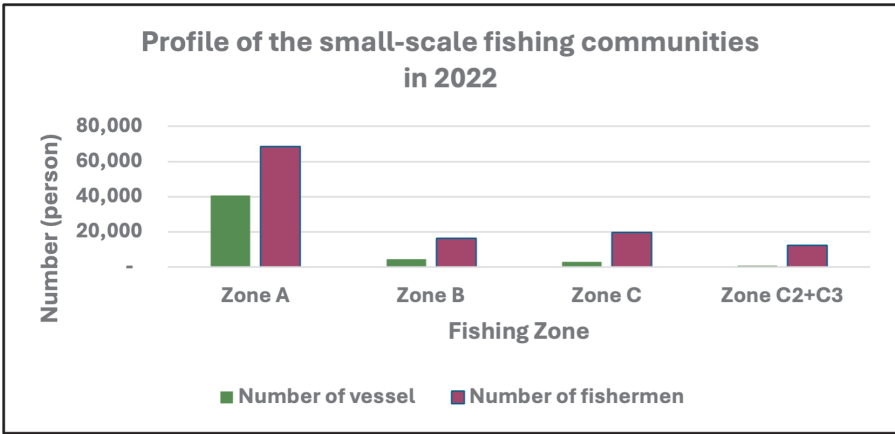


Figure 2. Profile of small-scale fishers in Malaysia. Source: Department of Fisheries Malaysia, 2023

Key drivers of socio-economic uncertainty

Environmental Factors: Environmental factors are a major driver of socio-economic uncertainty for small-scale fishers. Changes in climate, the depletion of fish stocks, pollution, habitat destruction, and unpredictable weather patterns all contribute to the vulnerability of these communities. With limited resources and infrastructure, small-scale fishers are often at the mercy of these environmental shifts, making it difficult for them to sustain their livelihoods and plan for the future. Solutions such as sustainable resource management, ecosystem conservation, and climate adaptation strategies are critical for mitigating these uncertainties.

Economic Pressures: Economic pressures are a significant driver of socio-

economic uncertainty in small-scale fisheries. Fluctuating fish prices, rising operational costs, competition with industrial fishing, and limited access to credit and markets all contribute to the financial vulnerability of small-scale fishers. Without consistent income and financial support, many small-scale fishers are caught in a cycles of poverty and debt, further exacerbating their economic insecurity. Addressing these economic challenges requires better market access, improved infrastructure, financial inclusion, and sustainable resource management to help small-scale fishers build more stable livelihoods.

Income instability and high poverty levels: Income instability and poverty are two of the most significant socio-economic challenges faced by small-scale fishers. The unpredictability of their income, combined with fluctuating fish prices, rising costs, and limited access to services and financial support, makes it difficult for these communities to escape the cycle of poverty. Without stable income, small-scale fishers are often unable to invest in their future, leaving them vulnerable to both economic and environmental shocks. Addressing these issues requires concerted efforts from governments, NGOs, and international organizations to improve access to markets, financial services, and alternative livelihoods for small-scale fishers (Kalikoski, et al., 2019).

Case study: Of unstable income and economic uncertainty

The case study on navigating socio-economic uncertainty and unstable income faced by for the small-scale fishers was conducted at Kampung Kubang Badak, Kuala Nerus District, Terengganu.

Study area

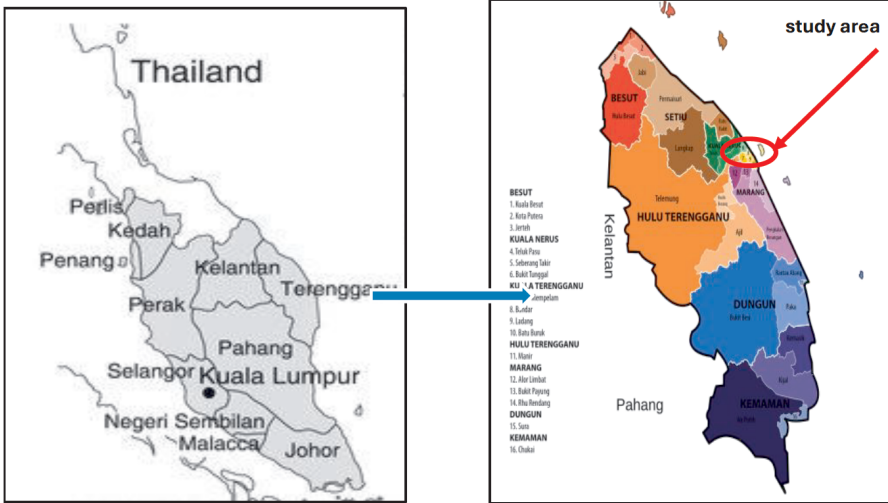


Figure 3. Location of study area: Kuala Nerus District, Terengganu State.
Source: Peninsular Malaysia map showing state boundaries (adapted from Wikipedia/Wikimedia Commons)
Terengganu state map (vector). Retrieved from FreeSVG database

The on-site informal interviews were carried out with local small-scale fishers conducted. The research and questions and points of conversation are outlined as follows:

1st: Questions about “economics of fishing and their life”

- Is their income fine or not? Generally, how much do they earn per day/month/... etc.
- Is the fisher the owner of the fishing boat or a worker/crew/fish-seller/... and so on.
- What is the economic situation in this area for fishers?

2nd: All about the sea, and their life around this coastal area

- About the life of fishers
- Family
- Son, daughter,. etc. Their life and how they are growing up right now.
- How are fishers supporting their family, by fishing or with any other income...?

3rd: How about the fishing currently...? In terms of fish resources, has it become worse, less... ?

- If the resources are declining, what do they have to say about it. What do they think, if the resource is becoming less. Ask about their ideas and views.

Lastly: Ask about what fishers want to say overall about fishers' lives and whether new generation should choose this fishing life.? If yes/no, then, why...?

The interviews were conducted in the local language and the conversation were recorded and further transcribed for the analyses.



Figure 4. Return of fishers from the sea with a low catch, Kampung Tok Jembal, 2025 © Authors



Figure 5. Fresh fish market where fishers direct sell the catches after they are landed, Kampung Tok Jembal, 2025 © Authors

The outcome of interview discussion is presented below.

Discussion topic 1: Economics of fishing and fishers' life

Mr. Cik Muhammad

- Income for Mr. Cik Muhammad is very low.
- His daily income is less than RM 100.
- He is a fisher and the owner of a fiberglass boat.
- He believes the current decline in fishing is due to less rain and the foreign fishers coming to fish.
- The fishers' catches in recent years have been getting poorer.
- The fishers can get decent catches only during rainy weather and big waves.
- He would buy gold during the monsoon season to sell it when there were fewer fish to make ends meet.

Mr. Khairuddin

- Income for Mr. Khairuddin is very low.

- Daily income for Mr. Khairuddin is around RM 200, but sometimes the income is just enough to cover the fuel for the daily fuel trip.
- He is the fisher and the owner of a fiberglass boat.
- In the past, his daily income could reach up to RM 500. Now his daily income has decreased, because the fish catches have decreased in most of the fishing operations.
- The economic situation in this area for fishers is hard.
- The fishers follow the season and the weather; fish catch during the monsoon is uncertain.
- Compared to the last 5 years, the fish catch has been on a declining trend. One of the main factors of low catch is due to the trawlers' encroachment.

Discussion topic 2: Information about the sea, the fishing ground and the livelihood

Mr. Cik Muhammad

- Mr. Cik Muhammad will go fishing after dawn (5:30 am to 6:00 am) and return at noon.
- His wife is a government employee. He has a son and a daughter. The son, who is the younger child, is in the 4th grade of high school while the daughter is studying at MARA Technological University (UiTM).
- His family relies on his wife's income and his part-time job as a fisher.
- Additionally, if the catch is bad, he works in the agricultural farms, taking up part-time jobs like gardening, house building to support the day-to-day cost of daily living.

Mr. Khairuddin

- Mr. Khairuddin used to go fishing at 4:30 am until 1:00 pm or spending more time fishing until he got enough harvest.
- He has 2 wives; both are housewives.

- He has 6 children, all of them are in school except the youngest one. They participate in religious tuition program at University Malaysia Terengganu, the name of the program is 'Asnaf to Asnaf'.
- Two of his children are pursuing education at the high school level, two are in primary school, and one is in the preschool.
- He is a full-time fisher, and his family depends solely on his income for their livelihood.

Discussion topic 3: Current condition of fishing and involvement of future generation

Mr. Cik Muhammad

- Mr. Cik Muhammad is part of a crew that works on the big boats in Pulau Duyong and Pulau Kambing.
- The cost of fishing for one week is around RM 50,000.
- He usually leaves jetty for fishing on Friday night and returns on Thursday; he doesn't work on Friday.
- They face high costs if the catch is low. But if there is a lot of catch, then they return home early, in less than a week.

Mr. Khairuddin

- When the government implemented the Movement Control Order (MCO), the fishing results were good, and the licensed fishers were allowed to catch fish.
- All fishers do not necessarily know how to swim.
- The fiberglass boats that stopped by the beach once overturned on the ground, and all the oil spilled.
- Subsidies for fishers are only given to fuel and petrol, and the catch subsidies is provided according to the amount of fish caught: for example, catch subsidy of 20 cents per kg of fish if the fishers catch more than 10 kg per trip.

- He does wants his children to become fishers. He supports his children in following a different path and choosing a job that is easier than that of a fisher.

Conclusion

Small-scale fishery in Terengganu State provides livelihoods and generates major source of income for the fishers. The local community, especially for B40 group (poorest income group), which indicates to households with total monthly earnings below RM 4,850 (about USD 1,077) are rely mainly rely on traditional fishing. However, the livelihoods of small-scale fishers are still uncertain and the root cause is probably overfishing and illegal fishing by the commercial trawlers that use destructive fishing gear. However, socio-economic livelihood of small-scale fishers is still in uncertain condition, and the root cause is probably due to overfishing and illegal fishing by trawl commercial fishing vessel with destructive fishing gear. The interview sessions with fishers from the village in Terengganu State indicated the suffering of small-scale fishers caused by the serious impact of trawlers. The weather and climate change effect on the fish resources is one of the impacts on the catch and income, however, the impact of IUU fishing has huge impact on the catch and consequently on the income. The fishers also not willing to include their children and new generation in the fishing industry due to uncertainty.

Qualitative evidence from interviews with small-scale fishers in coastal villages of Terengganu State reveals a high degree of livelihood vulnerability driven by both environmental and institutional stressors. While climate variability and adverse weather conditions have increased uncertainty in fishing operations and contributed to fluctuating catch levels and income, these environmental pressures are perceived as secondary to the structural impacts of IUU fishing. In particular, the encroachment of commercial trawl vessels into traditional fishing grounds has significantly reduced resource availability, undermined fishing efficiency, and intensified economic insecurity among small-scale fishers.

These cumulative pressures have weakened the resilience of small-scale fishing livelihoods by eroding their capacity to absorb shocks and sustain stable income over time. Limited access to alternative livelihood opportunities, combined with weak enforcement of fisheries regulations, constrains fishers' adaptive capacity and heightens their exposure to external risks. As a result, many fishers perceive the fishing sector as increasingly unsustainable, not only in ecological terms but also as a viable livelihood pathway. This perception is reflected in their reluctance to encourage younger generations to enter the fishing industry, signalling a breakdown in intergenerational livelihood continuity.

From a Blue Economy and policy perspective, these findings underscore critical governance gaps in fisheries management, particularly in regulating fishing capacity, enforcing spatial zoning, and curbing IUU fishing. Addressing these challenges requires policy interventions that move beyond productivity-driven Blue Economy narratives towards a more inclusive and livelihood-centered approach. Strengthening monitoring, control, and surveillance (MCS) systems, enhancing co-management arrangements, and providing targeted livelihood support for small-scale fishers are essential to improving resilience, restoring adaptive capacity, and ensuring that Blue Economy development contributes to equitable and sustainable coastal livelihoods in Malaysia.

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How Subsidy Reduces the Burden for Small-Scale Fisheries Vulnerability

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*“It’s not about making a fortune; it’s about making a life.
For some, it’s just fish. For me, it’s a way of life”*

Abstract

This chapter presents a qualitative case study based on an interview with a small-scale fisher in Mersing, Johor, and examines how fisheries subsidies can reduce livelihood vulnerability. The case of Muhammad Sufian (‘En. Sufian’), a 38-year-old nearshore fisher and crabber, highlights the way fuel, gear, and maintenance costs interact with seasonal income instability, especially during periods of rough weather when fishing activity may be constrained for months (Islam et al., 2021). In Malaysia, fuel support for registered fishers is institutionalized through the Fisher’s Diesel and

Petrol Subsidy Scheme administered by LKIM (Lembaga Kemajuan Ikan Malaysia, 2023), and subsidized diesel for fishers is maintained under the targeted diesel subsidy implementation in Peninsular Malaysia (Ministry of Finance Malaysia, 2024). Drawing on En. Sufian's daily practices, household responsibilities, and engagement with the local fishers' association, the chapter identifies pathways through which subsidies improve resilience: lowering trip costs, protecting productive assets, smoothing income across seasons, reducing debt risk, and supporting social well-being. The chapter concludes with recommendations to strengthen flexible support, capacity building, and social protection while improving youth participation through modernization and mentorship (Islam et al., 2021).

Background

Muhammad Sufian, widely known in his community as En. Sufian, is a 38-year-old fisher from Mersing, Johor. His life story reflects the challenges and resilience of traditional fishers in Malaysia. En. Sufian's journey into fishing began early, shaped by his upbringing in a coastal community where fishing was a primary means of livelihood. Born into a family with limited resources, En. Sufian faced various socio-economic hurdles that led him to leave school at a young age, effectively ending his formal education. The financial strain on his family and a lack of interest in academic pursuits meant that he spent more time near the beach and among the local fishing community, absorbing the skills and knowledge that would become foundational in his life as a fisher (Islam et al., 2021).

From as young as 14 years old, En. Sufian would accompany his father and other local fishers to sea. These formative experiences nurtured his affinity for the sea, and he soon learned to appreciate the camaraderie and sense of freedom that fishing brought. His skills developed rapidly through hands-on learning, and he became well-versed in various fishing methods, including net fishing and line fishing, and later expanded his expertise to include crabbing. By the age of 18, En. Sufian had fully embraced the lifestyle of a fisher, following in his father's footsteps and gradually building

his reputation within the fishing community.

The daily life of a fisher like En. Sufian is marked by early mornings and long hours at sea, punctuated by moments of reflection and the simple joy of bringing home a day's catch. On most days, he sets out before dawn, often around 4:00 AM, with the goal of securing a decent catch before noon. His primary catch includes fish and crabs, with crabbing being a particular area of expertise for him. Crabbing requires not only patience and skill but also a deep understanding of the marine environment and knowledge of where to set traps effectively. En. Sufian's connection to the sea is profound. He describes fishing as not merely a job but a way of life that resonates with his sense of identity and purpose. Despite the physically demanding nature of the work, he finds solace and satisfaction in his independence and the freedom to operate at his own pace. The ocean, he says, has a calming effect, providing him with a reprieve from the challenges onshore and allowing him to focus on the task at hand. However, the unpredictability of fishing can be taxing, and there are days when, despite his best efforts, he returns with little to no catch. This, he says, is "part of the life" of a fisher, where patience and resilience are as vital as skill (Islam et al., 2021; Bamasood et al., 2025).

En. Sufian is a dedicated family man. Married with four children, he sees fishing as both a calling and a responsibility to provide for his family. His wife manages the household and supports him through the highs and lows of his career, often helping with financial management to ensure the family's stability. While fishing offers daily income, the seasonal nature of the work requires meticulous planning. During peak fishing seasons, En. Sufian earns enough to cover expenses and set aside some savings. However, the monsoon season, which can last up to four months, presents a significant financial challenge as fishing activities are halted. To manage during these periods, he relies on savings built up during productive months and, on occasion, assistance from his local community or the fishing association.

In addition to basic family expenses, En. Sufian must account for the costs of fishing equipment, fuel, and boat maintenance. Fishing gear, particularly nets and crab traps, often needs repairs or replacement due to wear and

tear from daily use. To reduce costs, he sometimes performs repairs himself, a skill he picked up over years of working alongside other fishers. Fuel expenses are another considerable cost, especially given the long distances he sometimes travels to find better fishing grounds. Despite these expenses, En. Sufian manages to sustain his family through careful budgeting, a trait he has cultivated over years of managing seasonal income.

En. Sufian's involvement in the fishing community extends beyond his role as a fisher; he has become an active member of his local fishers' association, contributing to its functions and supporting his peers. His engagement with the association and his informal support for fellow fishers reveals a commitment to fostering unity and addressing the challenges within the fishing community. En. Sufian has been a member of the local fishers' association for several years. This organization serves as a unifying body for fishers in Mersing, providing a platform for collective advocacy, access to resources, and community support. En. Sufian's involvement in the association illustrates his dedication to improving the welfare of his peers and working toward the collective good of the community. His contributions to the association include:

Advocacy and representation: As an active member, En. Sufian participates in discussions and meetings to voice the concerns of local fishers, particularly regarding issues like fuel subsidies, fishing permits, and maintenance support for equipment. His presence and input in these forums provide a critical link between the fishers' needs and the resources provided by local authorities or governmental bodies.

Committee participation: En. Sufian occasionally serves in informal roles within the association, assisting with organizing meetings and community events that bring fishers together to address common issues. He helps with logistics, ensures that members are informed about association activities, and encourages fellow fishers to attend meetings and stay engaged with the association's initiatives.

Supporting welfare efforts: The association also plays a role in ensuring the welfare of fishers, especially during difficult seasons like the monsoon period when fishing is less viable. En. Sufian assists in disseminating

information on welfare programs or subsidies and, when possible, helps his peers navigate the often-complex application processes for aid. This role highlights his position as a trusted figure among fishers, especially for those who may struggle to access information or resources independently.

Fishing activities

In the case of En. Sufian, his fishing practices revolve around specific types of catches, boats, and nets that align with both the demands of the local market and his operational capabilities. Here's an in-depth look at his preferred catches and the equipment he uses:

Preferred catches

1. **Crabs (Ketam):** En. Sufian has a strong focus on catching crabs, which he refers to as a "favourite" catch. Crabs are in steady demand, and their market price can be relatively high, making them a profitable target for small-scale fishers like him. The document suggests that he uses specialized traps to capture crabs, which are essential for maintaining the quality and marketability of his catch.
2. **Pomfret (Bawal):** Another valuable catch for En. Sufian is pomfret, particularly the black pomfret. Known locally as 'ikan bawal,' this fish has a high market value and can fetch a good price, especially during off-peak fishing seasons when certain types of fish become harder to find. His focus on pomfret may be due to its stable demand and its suitability for nearshore fishing, where he primarily operates.
3. **Seasonal adjustments:** En. Sufian appears to adapt his catch focus based on seasonal availability. For instance, the document indicates that he adjusts his fishing strategy and choice of target species based on the season, which could be influenced by monsoon patterns and fish migration. This adaptability is crucial in ensuring consistent income throughout the year. (Rahman, 2022; Islam et al., 2021)

En. Sufian uses a fiber boat referred to as 'Boat A,' which is a small, lightweight boat commonly used by small-scale fishers for nearshore and coastal fishing. The Boat A type is notable for its suitability for areas closer to shore, where it provides sufficient manoeuvrability and accessibility. This boat type is designed to be functional and cost-effective, with relatively low maintenance compared to larger, commercial fishing vessels. The fiber material is durable and resistant to the wear-and-tear of saltwater, making it a sustainable choice for En. Sufian's daily fishing activities. En. Sufian uses 'pukat' nets, a general term for various types of fishing nets. Pukat nets come in different mesh sizes and lengths, which are chosen based on the target species. For example, finer mesh nets would be more suitable for smaller fish, while larger mesh sizes would cater to bigger species like pomfret. Nets are vital for his fishing practices, allowing him to cover a broad area and catch multiple fish with each trip, maximizing his yield and efficiency (Islam et al., 2021).

For catching crabs, En. Sufian employs specific traps designed to lure and capture crabs efficiently. Crab traps are usually made from metal or durable materials that can withstand underwater conditions and repeated use. The traps are typically baited and positioned in areas known for crab activity, then left for a period before retrieval. Using these traps helps ensure that the crabs are caught live, which improves their market value and freshness, allowing En. Sufian to command higher prices for his catch. By focusing on high-value species like crabs and pomfret, he maximizes his income while keeping costs manageable, especially with subsidies helping cover fuel and maintenance expenses. His careful choice of equipment also reflects an effort to maintain profitability despite the challenges posed by weather and resource availability.

Importance of subsidies in helping En. Sufian's vulnerability as a small-scale fishery

En. Sufian's life as a small-scale fisher involves navigating financial instability due to fluctuating incomes and seasonal hardships, particularly during the monsoon months when he cannot fish. While the fishing trade provides day-to-day earnings, it also incurs significant costs in terms of fuel, equipment maintenance, and other operational expenses. Given these constraints, En. Sufian relies on subsidies to support his livelihood, which provides crucial relief during low-income periods and offsets rising operational costs as follows:

Reduction in operational costs

A significant portion of En. Sufian's income is allocated to operational costs, primarily fuel. Subsidies on fuel play a crucial role in reducing these expenses, allowing him to continue fishing at a lower cost (Husain et al., 2020). This support is particularly important during seasons when fish stocks are lower, as the subsidy allows him to maintain regular fishing trips without the prohibitive costs associated with full-priced fuel. This reduction in operational expenses is essential in enabling En. Sufian to sustain his income levels, especially when fish catches are unpredictable.

Support for equipment and maintenance

Fishing requires regular maintenance of boats and equipment, both of which incur high costs. Government subsidies or targeted aid for equipment upkeep relieve En. Sufian from bearing the full cost of these essential investments. By receiving support in maintaining his fishing nets and boat, he can operate safely and efficiently, which increases his competitiveness. This access to affordable equipment maintenance helps him maintain a viable operation and protects his investment from deteriorating prematurely,

which would otherwise be a significant financial burden (Islam et al., 2021).

Mitigation of seasonal financial instability

Fishing income is inherently seasonal due to factors like monsoon weather that restricts fishing activities for several months of the year. Subsidies provide a financial buffer that helps En. Sufian navigate these lean months without needing to resort to high-interest loans or alternative employment, which may not be as profitable. With the government's support, he can manage his finances more effectively, ensuring that he has the necessary resources to support his family throughout the year. This assistance is vital in smoothing his income over the year and providing him with stability.

Enhanced livelihood security

Subsidies contribute to the overall security of En. Sufian's livelihood, allowing him to save for his family's future and avoid the cycle of debt common among small-scale fishers. The stability provided by subsidies is especially important, as fishing is his primary source of income and he has limited job alternatives. This support helps him cover basic expenses during periods of low catch, thereby reducing the stress associated with financial vulnerability. By providing a dependable safety net, subsidies enable En. Sufian to focus on fishing without the constant worry of financial instability.

Promotion of social well-being

The reduction in financial strain due to subsidies positively impacts En. Sufian's social well-being. Knowing that he has government support during challenging periods gives him a sense of security and allows him to continue working in a field he is passionate about. The stability provided by these subsidies not only contributes to his financial resilience but also improves his mental and social well-being, as he can focus on his family and community without the added stress of economic insecurity (Islam et al., 2023).

Subsidies play an essential role in reducing the financial vulnerability of small-scale fishers like En. Sufian. By alleviating the burden of operational and maintenance costs, providing stability during seasonal downturns, and promoting social well-being, government subsidies are integral to sustaining his livelihood. This support allows En. Sufian to continue working in the fishing industry, providing for his family, and contributing to his community's local economy. In doing so, subsidies are not merely financial aids; they are a crucial element of livelihood security and well-being for small-scale fishers facing uncertain economic conditions. This case illustrates the broader importance of subsidies in ensuring the sustainability of small-scale fisheries and supporting communities that rely on fishing as their primary economic activity.

En. Sufian's decision to remain a small-scale fisher for more than a decade, despite the availability of other employment options, is influenced by multiple deeply rooted factors. His commitment to this career stems from personal, cultural, and practical reasons that reflect both his passion for the work and the unique benefits it provides him as follows:

Limited access to alternative employment

With lower qualifications, En. Sufian's job options outside of fishing are restricted. Many modern jobs, especially in urban areas, demand specific educational credentials or technical skills that he may not possess. Without these qualifications, he is unlikely to secure positions in fields such as office work, or administration, which are increasingly common career paths for young people. This limitation makes fishing a more viable option, where his practical skills and experience hold significant value. In addition, En. Sufian has honed practical skills in fishing; such as operating his boat, using fishing nets effectively, and understanding local fishing patterns that do not rely on formal education. His extensive experience and knowledge of the fishing trade allow him to sustain his livelihood independently, without needing additional training or qualifications. In contrast, transitioning to a new industry would require him to learn new skills or obtain qualifications,

which may be time-consuming, costly, and challenging, especially as he needs to support his family consistently (Rahman, 2022).

Financial independence and immediate income

One of the main attractions of fishing for En. Sufian is the immediate income it generates. Unlike salaried jobs that may offer delayed or monthly payment, fishing provides daily earnings, allowing him to have cash on hand each day he works. This immediate income structure is advantageous in supporting his family's daily needs and gives him a sense of financial control that other jobs may not offer. Despite the income variability associated with fishing, the opportunity to earn on a daily basis seems to be a significant factor in his choice to continue. In the document, he mentions the importance of being able to secure day-to-day earnings, which allows him to meet his financial obligations directly, without depending on delayed payments or fixed monthly salaries. This flexibility and cash flow are critical for someone supporting a family, as it provides him with the security to manage household expenses independently.

Autonomy and flexibility

Fishing grants En. Sufian a level of autonomy and flexibility that is less common in other occupations. As a fisher, he sets his own schedule, deciding when to go to sea and how long to work. This independence contrasts with more structured jobs, where employees must adhere to strict working hours and report to supervisors. For En. Sufian, this flexibility is valuable because it allows him to balance his work with family life and other responsibilities.

This study suggests that he appreciates the freedom that comes with fishing, where he isn't 'tied down' by the constraints of a typical job. This autonomy enables him to maintain a work-life balance that suits his personal and family needs. The ability to adjust his hours based on his financial requirements or the fishing conditions offers a unique benefit, especially in a job market where many young people are attracted to the stability of fixed

jobs but lack similar flexibility.

Community and cultural connection

Fishing is deeply embedded in En. Sufian's community and culture, creating a sense of camaraderie and belonging. Based on the interview session, it was revealed that he is part of a close-knit fishing community, which provides him with support and solidarity. This social aspect of his work fosters a strong community bond, where fishers share resources, advice, and sometimes even financial assistance during tough seasons. The shared understanding of the lifestyle, challenges, and joys of fishing builds a unique culture that is difficult to replicate in other jobs.

Access to government support and subsidies

While fishing is challenging and financially unstable at times, En. Sufian benefits from government subsidies that help offset his operational costs. These subsidies reduce expenses for essential needs, such as fuel and equipment maintenance, which makes it more feasible for him to continue in the industry. This financial support is a key factor in reducing the inherent risks of fishing, providing a safety net that would not be available if he pursued a different type of work. These subsidies not only alleviate his financial burden but also strengthen his sense of loyalty to the profession. The government's support demonstrates that small-scale fishing is valued as a critical component of the local economy, reinforcing En. Sufian's belief in the importance of his work. By staying in this field, he continues to qualify for subsidies that improve his livelihood, offering a level of security that may not be present in other jobs without such support (Husain et al., 2020).

Skill specialization and limited alternatives

Over his years as a fisher, En. Sufian has developed a specialized skill set tailored to small-scale fishing. This includes knowledge of the local fishing grounds, expertise in handling specific types of nets and boats, and an understanding of seasonal fish behaviours. Such expertise takes years to develop and is not easily transferable to other industries. As a result, his proficiency in fishing makes it challenging to consider alternative employment, as he would likely need to start from scratch in a new field.

In summary, En. Sufian's decision to avoid other popular jobs among young people, such as gig work, factory jobs, or administrative roles, is influenced by his preference for autonomy, immediate income, and alignment with his cultural heritage. Fishing provides him with a sense of identity, freedom, and community that modern jobs cannot easily replicate. Additionally, his established skills, loyalty to his fishing community, and the financial stability provided by government subsidies further reinforce his commitment to the profession. For En. Sufian, fishing is more than just an occupation; it is a lifestyle and a legacy. The satisfaction, independence, and security it offers make it a more fulfilling choice compared to contemporary jobs that may offer income but lack the deeper connections and meaning that fishing brings to his life (Rahman, 2022).

Reasons why young people are not interested in small-scale fishing

Based on En. Sufian's observations, there are several reasons young people are reluctant to enter small-scale fishing, as well as suggestions on how to attract them to the profession. En. Sufian notes both practical and social factors that deter young people, and he offers insights on how these barriers might be addressed to encourage greater participation in the industry.

Unpredictable and lower income

En. Sufian highlights the financial uncertainty that comes with fishing. Unlike salaried jobs, fishing income can vary significantly due to factors like seasonal fluctuations, weather conditions, and catch availability. This unpredictability, coupled with the high costs of fuel and equipment, makes fishing seem less attractive compared to jobs that offer stable, fixed incomes. Young people often seek financial stability, and the variability of fishing income can be a major deterrent.

Physically demanding work

Fishing is labour-intensive and requires physical endurance, with long hours spent at sea in sometimes challenging and unsafe conditions. This can be exhausting, especially for young people who may not be accustomed to or interested in such physically demanding work. Modern job options, which are less physically intensive, may seem more appealing to younger generations, who prefer work environments with more comfort and safety.

Perception of fishing as a low-status job

En. Sufian suggests that some young people view fishing as a traditional or outdated occupation with limited social prestige. In a rapidly modernizing society, younger individuals are often attracted to jobs that align with current trends, such as technology or corporate roles. The perception of fishing as a low-status, 'hard-labour' job makes it less attractive to those who aspire to careers perceived as more progressive or prestigious.

Desire for urban living and modern lifestyles

Many young people are drawn to urban centers for their modern amenities, lifestyle opportunities, and diverse job markets. Fishing, being a rural and coastal occupation, typically requires living in smaller, less urbanized areas.

The appeal of city life and the opportunities it provides can pull young people away from traditional occupations like fishing, which often involve a more isolated and rural lifestyle.

Thus, there are a few suggestions from En. Sufian to attract young people to join this industry as follows:

Provide financial incentives and stability

To make fishing more appealing, it would be beneficial to offer financial incentives that reduce income volatility and make the profession more financially viable. For example, introducing a productivity incentive or grants specifically for young fishers could help alleviate operational costs, such as fuel and equipment maintenance. Creating financial safety nets, such as access to insurance or guaranteed minimum income during lean seasons, could also address the instability that discourages young people from entering the field.

Modernize the profession with technology and innovation

Integrating technology into small-scale fishing could make the profession more attractive to younger generations. For instance, providing training on using GPS for navigation, digital monitoring of fish stocks, and even drones for locating schools of fish can modernize the industry. Introducing technology not only improves efficiency but also aligns fishing with the tech-driven interests of young people, making it a more exciting and forward-looking profession.

Increase awareness of the importance of fishing for food security

Educating young people about the critical role that small-scale fishing plays in food security and the local economy could foster a sense of purpose and pride in the profession. En. Sufian could emphasize that fishing is not

merely a job but a vital contribution to society, providing fresh seafood and supporting local communities. Highlighting the sustainability aspects of small-scale fishing could also appeal to environmentally conscious young individuals who value conservation and sustainable practices.

Foster a supportive fishing community with mentorship programs

Establishing mentorship programs where experienced fishers like En. Sufian can guide young fishers through the challenges of the industry can provide essential support and motivation. Mentorship allows young people to learn the intricacies of the trade, gain hands-on experience, and build resilience through guidance from seasoned fishermen. This supportive environment can make the profession less intimidating and more appealing, especially for those with limited exposure to fishing.

Emphasize the autonomy and flexible lifestyle fishing offers

Small-scale fishing provides a level of autonomy and flexibility that is rare in many modern jobs. En. Sufian could promote this aspect by highlighting the freedom to set one's own schedule and the lack of strict managerial oversight, which may appeal to young people who prefer independence over rigid job structures. Emphasizing that fishing offers a balanced work-life structure and opportunities to work in natural, outdoor environments may attract those who dislike the constraints of traditional office jobs.

Recommendations

1. **Enhanced and flexible subsidy programs:** Subsidies are crucial for supporting fishers, especially during off-seasons and adverse weather conditions. To better address the needs of small-scale fishers, the government should consider implementing **flexible subsidy programs** that increase support during low-yield seasons or when fishing activities are restricted. These subsidies should cover essential

costs, including fuel, equipment maintenance, and basic living expenses, ensuring that fishers can maintain their livelihoods throughout the year. Adjusting subsidies to account for inflation and rising operational costs would also make them more effective.

2. **Targeted financial aid for vulnerable fishers:** Different fishers face varying economic needs based on family size, health status, and seasonal catch variations. A **targeted financial aid system** could assess fishers' individual circumstances and provide additional support to those who need it most, such as those with larger families, school-going children, or medical expenses. Regular assessments would ensure that financial aid is directed to households at the highest risk, providing a safety net that helps prevent financial crises among vulnerable groups.
3. **Access to modern fishing equipment:** Outdated equipment can increase costs and limit productivity. Providing **subsidies or low-interest loans** for modern, durable, and environmentally friendly fishing equipment, like efficient motors and selective fishing gear, would enhance fishers' productivity and reduce operating expenses. Improved equipment can also make fishing less physically demanding and more appealing to younger generations, potentially reducing the labour intensity associated with traditional fishing methods.
4. **Training and capacity building for fishers:** Training fishers in areas like financial management, sustainable fishing practices, and alternative income opportunities can greatly improve their resilience.
 - **Financial management:** Basic budgeting and savings skills to help fishers manage income fluctuations.
 - **Sustainable fishing practices:** Techniques that minimize environmental impact, such as selective fishing methods and seasonal fishing to prevent overfishing.
 - **Alternative income skills:** Training in aquaculture, fish processing, or tourism to provide supplemental income during low seasons, reducing reliance on fishing alone.
5. **Social security and insurance for fishers:** Fishing is a high-risk occupation with frequent exposure to hazardous conditions. Estab-

lishing **social security measures tailored for fishers** would provide essential protection and encourage younger generations to see fishing as a secure career. Key areas of support include:

- **Life insurance:** Coverage for injuries or loss of life while at sea.
- **Retirement benefits:** A pension system to ensure income security in old age.

6. **Strengthening fishery associations for collective bargaining:** Local fishery associations can offer a platform for fishers to advocate for fair prices, negotiate directly with buyers, and manage shared resources. The government could support these associations by providing funding for administrative costs, **training in negotiation and resource management**, and enabling joint marketing initiatives that would allow fishers to sell their catch collectively, potentially securing higher prices and reducing reliance on middlemen.

Conclusion

En. Sufian's journey as a small-scale fisher encapsulates the challenges, resilience, and dedication that define the lives of many coastal fishers. His early start in the fishing industry, driven by limited educational opportunities and economic needs, set the stage for a lifetime of learning and adaptation. Over the years, he has navigated the ups and downs of a profession marked by seasonal vulnerabilities, fluctuating income, and environmental uncertainties (Rahman, 2022; Bamasood et al., 2025).

Despite these challenges, En. Sufian has shown remarkable resilience, relying on his skill, experience, and community support to sustain his livelihood. His commitment to his trade is not merely a choice but a necessity, as limited access to alternative employment options in his region restricts his ability to diversify income sources. Furthermore, his preference for self-reliance, coupled with a deep connection to his role within the fishing community, highlights the cultural significance and personal identity tied to his profession (Islam et al., 2023).

En. Sufian's reliance on subsidies and external support underlines the

importance of government assistance for small-scale fishers. Subsidies provide critical financial relief, especially during monsoon seasons and periods of low catch, helping fishers cover operational costs and sustain their families. However, his experience also reveals the limitations of current support systems, as the rising costs of equipment and maintenance, coupled with the occasional delays in aid, create ongoing financial strain. This case study illustrates the need for more comprehensive, timely, and tailored subsidy programs that address both short-term needs and long-term stability for fishers (Husain et al., 2020).

As En. Sufian looks toward the future, he expresses a desire for his children to pursue more stable, less physically demanding careers, reflecting broader concerns within the fishing community about the sustainability of small-scale fishing as a viable livelihood. This case study highlights the urgency of developing initiatives that not only support the small-scale fishers economically but also enhance the appeal of the industry for younger generations. Providing access to modern equipment, training, and diversified income opportunities, alongside fostering a more robust social security framework, could play a crucial role in revitalizing interest in fishing as a sustainable career.

In conclusion, En. Sufian's story is emblematic of the struggles and hopes of small-scale fishers. His resilience underscores the strength of individuals who persist in this vital yet challenging industry. Addressing the multifaceted needs of fishers like En. Sufian through targeted support, sustainable practices, and community empowerment will be essential for securing the future of small-scale fisheries and preserving the livelihoods and heritage they represent.



Figure 1. En. Sufian (left) and his boats (right), Pusat Perikanan Mersing, Johor, 2024 © Wan Mohd Fadhlán Bin Wan Azmi

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Unveiling the True Value and Return of Investment (ROI) of Small-Scale Fishers in Port Dickson, Negeri Sembilan, Malaysia

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Abstract

As dawn breaks over Port Dickson, fishers increasingly speak of loss rather than abundance, a sentiment reflected in this study where over 70% agreed that fish landings have declined. Based on data from 37 predominantly Malay, middle-to-older aged fishers with mainly secondary education, the analysis reveals that although small-scale fishing remains financially viable, it is under a mounting strain. Over a 25-year horizon, fish traps deliver the highest average net present value (RM 1.48 million; BCR⁵ 6.9), followed by

⁵ BCR= Benefit–Cost Ratio

handlines (RM 461,172; BCR 6.8) and drift nets (RM 286,048; BCR 3.2), yet these returns are increasingly threatened by rising monthly operating costs exceeding RM 4,300, unpredictable weather, escalating fuel and equipment prices, and the degradation of coastal ecosystems due to reclamation and intensive development. The findings portray a community that is still able to earn from the sea, but only just, underscoring that the future of Port Dickson's fishing economy now depends on sustainable practices, supportive policies, and smarter investment choices to safeguard both livelihoods and marine resources.

Casting the net on Port Dickson's fishing industry

Port Dickson, a coastal town in Negeri Sembilan, is well-known for its beautiful beaches and pleasant environment. It is also a popular tourist destination, attracting tourists from all over the region. Its sandy beaches, such as Pantai Cahaya Negeri and Teluk Kemang, are popular with tourists looking for a beach getaway. Aside from its vital tourism industry, Port Dickson is also known for its vibrant fishing population, which has woven a tapestry of history and livelihood over decades. The town's fishing legacy is firmly ingrained in its culture, with generations of fishers relying on the rich coastal waters for food and financial security. This dual identity as a tourist destination and a fishing hub highlights the delicate balance between economic development and the preservation of local livelihood.

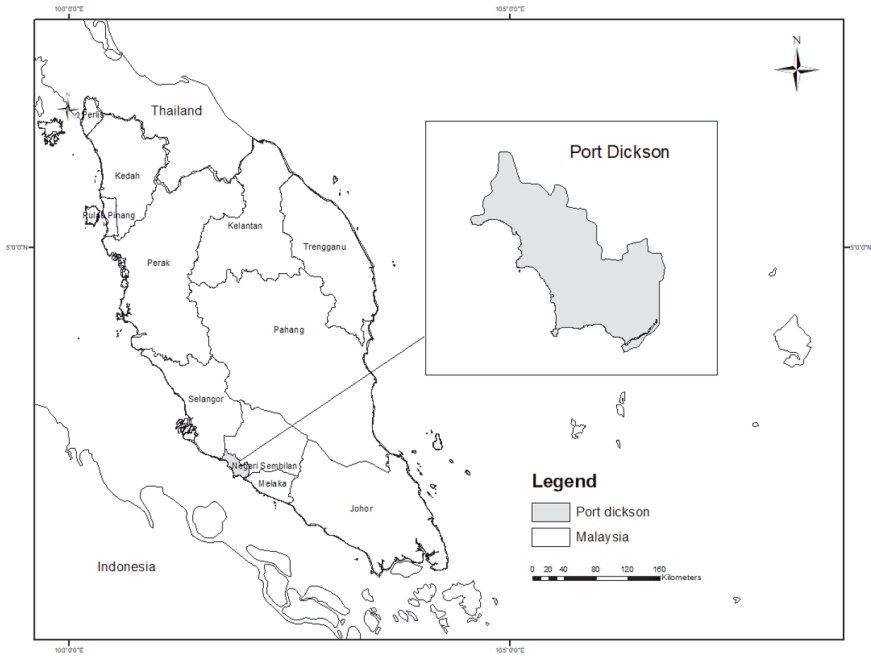


Figure 1. Map of the Peninsular Malaysia highlighting Port Dickson (2024).
Designed by authors using GIS software (ArcMap 10.8)

Within the realm of this study, a mesmerizing exploration awaits, endeavouring to unravel the true essence and paramount Return on Investment (ROI) bestowed upon the fishing equipment that rests in the hands of these extraordinary individuals. In shedding light upon their economic realities, the veil of mystery will be lifted, exposing these local heroes' profound value to their community and the wider world.

Understanding small-scale fishers' lives

In Port Dickson, mornings are always bright with a gorgeous view of the placid sea, embellished with a multitude of small fishing boats happily setting out on their daily escapades. Thirty-seven experienced fishers participated in the study as respondents and contributed insightful information about their lifestyles. These people, working cooperatively in groups or individ-

ually, depend on a wide range of necessary tools – meticulously crafted nets, skillfully set traps, meticulously aligned lines, and sturdy vessels – to guarantee a plentiful harvest that supports their way of life and protects their priceless cultural legacy. These fishers, each with years of experience and a great connection to the sea, show Port Dickson’s fishing community’s endurance and adaptation in the face of changing conditions. Their methods not only benefit the local economy but also preserve the cultural continuity that has traditionally distinguished the region.



Figure 2. Fishing boats along the coast of Port Dickson, 2024 © Authors

Despite their unwavering dedication and tireless efforts, these resilient fishers consistently find themselves grappling with the burdensome challenge of diminishing profit margins. The exorbitant costs associated with the continuous maintenance of their prized boats, the intricate art of net repairing, and the necessity to replace worn-out gear steadily erode their hard-earned income, further intensifying the ever-pressing question of profitability.

The decline in fish landing quantities has become a notable concern among

the fishers. A significant 43.2% strongly agree, while 29.7% agree that the quantity of fish being caught has indeed decreased. Only a small fraction (8.1%) remains neutral or disagree with this observation. This sentiment clearly indicates that the majority of fishers are experiencing a noticeable reduction in fish availability, reflecting the growing challenges they face at sea.

In terms of ethnic composition, most of these fishers were Malay, with a total of 34 individuals representing 91.9% of the overall respondents. A small minority consisted of Chinese and Indian participants, with only 2 Chinese (5.4%) and 1 Indian (2.7%) respondent. This indicates that the study's population was predominantly Malay, while other ethnic groups contributed only a small fraction. Looking at age categories, the largest group of fishers fell within the 46 to 60-year age range, making up 45.9% (17 individuals). This was followed by those aged over 60, who comprised 32.4% (12 individuals). Fishers in the 31 to 45-year age group accounted for 21.6% (8 individuals). Notably, there were no fishers in the 18 to 30-year age bracket. These data suggest that most of the fishers are in middle to older age groups, which may imply that they possess more experience in the field being studied.

About their educational levels, the fishers with an SPM (equivalent to high school) qualification formed the largest group, making up 45.9% (17 individuals). This was followed by those with PMR/SRP (lower secondary qualifications) at 29.7% (11 individuals). Primary school education represented 13.5% (5 individuals), while fishers with STPM/Certificate/. Diploma qualifications made up 10.8% (4 individuals). There were no fishers who had no formal schooling. These data show that most fishers had secondary education as their highest level of educational attainment, with only a small number continuing to higher levels of education.

Overall, this demographic profile paints a picture of a study sample that is largely Malay, predominantly in the middle to older age groups, and mainly having secondary education as their highest qualification. This context provides insight into the fishers' experiences and educational backgrounds, which may influence their perceptions and opinions within this study.

Main fishing equipment and costs

The data collection took place in June 2024. By the end of the day, a total of 37 active fishers had been successfully gathered. Among these, 33 samples were from drift nets, representing the majority of the collection. Additionally, there were four samples from handlines and three from fish traps. Each sample contributed to painting a broader picture of the fishing methods used within the community. These tools, vital to their daily operations, come with their unique costs and expenses. For instance, depending on size and quality, a single gillnet can range from hundreds to thousands of ringgits. These substantial investments, necessary for successful fishing, are often overlooked but play a pivotal role in the fishers' overall financial performance. Moreover, alongside the expenses incurred in acquiring the fishing equipment, the maintenance of boats and engines adds significant weight to the fishers' operational costs.



Figure 3. A fisher near an estuary in Port Dickson is preparing to set sail, his hands deftly working through the final checks of fishing gear as the soft glow of dawn reflects on the calm sea, 2024 © Authors

These necessary components demand regular upkeep and attention, further contributing to the financial commitment required by the fishers. The price tag for maintaining and repairing these vessels and engines should not be underestimated, as it significantly affects the fishers' overall profitability and success. By delving into the intricacies of the expenditures linked to procuring and upkeeping fishing equipment, a clearer picture emerges, illustrating these diligent fishers' dedication and financial sacrifices. Their commitment to bearing these financial burdens showcases their unwavering determination to continue their livelihoods and provide for their families.

Calculating the ROI

Return on Investment (ROI) is the compass that guides these fishers through the economic seas. By analyzing the cost of fishing equipment relative to the revenue generated, we understand these investments' true value. A fisher may spend RM 5,000 on a net, but how much profit does that net yield over its useful life? This section navigates through the numbers, illustrating how ROI is calculated in the context of small-scale fishing. It delves into the factors affecting ROI, such as the seasonality of fishing, fluctuating market prices, and the quality of the catch. This analysis aims to uncover whether investing in fishing gear brings a sustainable return for Port Dickson's fishers.

Based on Table 1, the Average Net Present Value (NPV) for different fishing equipment reveals some interesting insights. For drift nets, the average NPV stands at RM 286,048. In contrast, fish traps boast a significantly higher average NPV of RM 1,477,610, while handlines have an average NPV of RM 461,172. When looking at the Average Present Value Benefit over 25 years, drift nets contribute RM 414,643, fish traps bring in RM 1,727,249, and handlines generate RM 540,822. The Average Present Value Cost encompasses both the initial investment and the ongoing maintenance costs incurred by fishers over the same 25-year period. For drift nets, this cost totals RM 128,595; for fish traps, it is RM 249,638; and for handlines, it amounts to RM 79,649.

The final piece of the financial puzzle is the Benefit-Cost Ratio, which

clearly indicates profitability. Drift nets yield a ratio of 3.22, fish traps come in at 6.92, and handlines register at 6.79. With a Benefit-Cost Ratio above 1.0, each type of fishing equipment is expected to generate a positive net benefit for the fishers. To put it simply, for every RM 1 invested, fishers can expect a return of RM 3.20 for drift nets, RM 6.90 for fish traps, and RM 6.80 for handlines.

Table 2 outlines the average monthly operating costs borne by fishers. The main components of these operating costs include wages for workers and maintenance expenses, which make up 0.7107% and 0.2748% of the total monthly costs, respectively. In monetary terms, this equates to RM 159.20 for wages and RM 61.56 for monthly maintenance.

These tables collectively illustrate the financial aspects of small-scale fishing, highlighting how investment in equipment and operating costs affect profitability over time.

Table 1. Average Net Present Value (NPV) for each type of fishing equipment

No.	Type of Fishing Equipment	Average Present Value Benefit (RM)	Average Present Value Cost (RM)	Average Net Present Value (NPV) (RM)	Benefit-Cost Ratio
1.	Drift Net	414,643	128,595	286,048	3.2
2.	Fish Trap	1,727,249	249,638	1,477,610	6.9
3.	Handline	540,822	79,649	461,172	6.8

Note: Values based on a 25-year usage period obtained from field study.

Table 2. Monthly operating costs for fishing

Item	Average Monthly Cost (RM)	Total Cost (%)
Operating Costs		
Lubricant Oil	252.05	5.813
Petrol	994.55	22.938
Food	350.24	8.077
Water	11.01	0.254
Block Ice	85.02	1.965
Salt	0.18	0.004
Miscellaneous	23.53	0.542
Wages (Workers)	159.2	3.671
Maintenance	61.56	1.419
Total Operating Cost	1,937.52	44.687
Straight-Line Depreciation (2%)	45.13	1.04
Opportunity Cost of Capital	415.58	9.585
Total Cost	4,335.76	100

Obstacles to maximizing ROI

Maximizing return on investment (ROI) in small-scale fishing is not straightforward. Port Dickson's fishers are confronted with many challenges that significantly impact their profitability. One of the major obstacles these fishers face is the unpredictable weather conditions, which can significantly affect the number of fishing days available. Moreover, the continuously increasing equipment and fuel costs gradually eat into their hard-earned earnings, making it increasingly difficult for them to sustain their livelihoods. On top of these difficulties, overfishing and rapid environmental changes pose a grave threat to the availability of fish, consequently making it even harder for the fishers to secure a consistent catch. The reclamation of coastal marine regions has significantly impacted the lives of fishers along Port Dickson's coastline. Previously productive fishing areas, these coastal zones have been altered by large-scale reclamation efforts, forcing fishers to sail further out into the open sea. This move presents substantial issues as

lengthier travels take more fuel and time, putting the financial burden on the fishers.



Figure 4. Fishing boats along the coast of Port Dickson, with a row of hotels and resorts visible in the background, 2024 © Authors

The expansion of construction operations exacerbates these problems. The cumulative impact has been severe, ranging from expanding ports and liquefied natural gas (LNG) platforms to rising tourism spots, resorts and hotels. The waters, which were once pure and filled with life, have become obscured with sediment due to continuous development. This turbidity interrupts fish breeding cycles, limiting the number of fish stocks. As a result, the fishers' catches have decreased, putting their livelihoods and Port Dickson's fishing economy at risk.

All of these hurdles create a ripple effect on the overall ROI, thus compelling the fishers to adapt and seek innovative approaches to sustain their businesses. The subsequent section delves deeper into these challenges, providing valuable insights into how they considerably shape the economic landscape of small-scale fishing in the Port Dickson region. This narrative

depicts the complicated relationship between coastal development and marine ecosystems, a developing issue that requires academic and policy attention. By comprehending and addressing these complex issues, stakeholders can work together to develop effective strategies that support the long-term viability and success of the local fishing industry.

Sustainable fishing and investment

The future of fishing in Port Dickson relies on the implementation of sustainable practices and intelligent investments. As fishers adapt to changes, the importance of environmentally friendly gear and methods becomes more apparent. Government backing and community initiatives are crucial in promoting the use of cost-effective and environmentally sustainable fishing equipment, which will ultimately improve the industry's overall sustainability.

This final section explores the potential for small-scale fishers to enhance their ROI through sustainable practices. By striking a balance between tradition and modernity, Port Dickson's fishing community can preserve their cultural heritage while ensuring a prosperous future. Through the use of innovative technologies and sustainable fishing techniques, the community can improve their economic standing and contribute to the ecological preservation of Port Dickson's marine ecosystem. Therefore, the stage is set for a promising future where sustainable fishing practices lead to a thriving and sustainable Port Dickson fishing industry.

Conclusion

Small-scale fishers in Port Dickson face the challenge of balancing tradition with economic viability. The high costs of fishing equipment, boat maintenance, and fluctuating market prices have made profitability difficult. However, strategic actions can enhance their profitability and secure a sustainable future. First, adopting cost-effective and durable fishing gear is crucial. Fishers can maximize their ROI over time by investing in high-

quality equipment with a longer lifespan. Additionally, they should explore alternative, environmentally friendly fishing methods, which can lead to consistent and high-quality catches, potentially fetching better market prices.

Additionally, investing in sustainable aquaculture practices, such as fish farming and oyster cultivation, can provide an additional source of income for small-scale fishers. These practices ensure a steady supply of fish and shellfish and contribute to the conservation of natural fish stocks. Moreover, collaboration among fishers in Port Dickson can yield significant advantages. Through the existence of current cooperatives or associations, fishers can pool resources and share knowledge and experiences. This collective approach can lead to better negotiation power with suppliers, buyers, and financial institutions. Additionally, cooperatives can facilitate joint marketing efforts, allowing fishers to reach a broader customer base and secure better product prices. Furthermore, these organizations can serve as training and capacity-building platforms, enabling fishers to acquire new skills and stay updated with evolving fishing practices.

To further increase profitability, small-scale fishers in Port Dickson should explore the potential of ecotourism as an alternative income stream. With its pristine beaches, diverse marine life, and rich cultural heritage, Port Dickson has the potential to attract tourists interested in sustainable and responsible travel. By offering guided fishing expeditions, snorkelling tours, and educational programs, fishers can generate additional revenue and raise awareness about the importance of marine conservation. This diversification of income sources can provide a buffer against unforeseen challenges and ensure a more stable and prosperous future for small-scale fishers.

In conclusion, by implementing these strategies, small-scale fishers can unlock a sustainable and profitable future while preserving the rich fishing heritage of Port Dickson.

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Between the Sea and School: Career Aspirations of the Children of Small-Scale Fishers in Kuala Perlis

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Abstract

This case study investigates the career aspirations of small-scale fishers' children in Kuala Perlis, a community where fishing is a traditional livelihood passed down through generations. With the local economy heavily reliant on fishing, children often face familial and cultural expectations to continue in this line of work, despite the instability and economic challenges it presents. Through semi-structured interviews with two experienced teachers from primary and secondary schools, this study explores how education intersects with these career expectations. It delves into the role of family traditions, economic hardships, and educational limitations

in shaping the children's career choices, alongside emerging interest in alternative professions such as gig work and small business ownership. The paper also highlights the influence of teachers and school initiatives on these students' aspirations, while addressing the barriers posed by social pressures and limited opportunities. Finally, recommendations are made to foster support systems, vocational training, and community collaboration to empower the children of fishers to explore a broader range of career paths.

Introduction

Kuala Perlis, a coastal town in the state of Perlis in north of Malaysia that is known for its deep-rooted fishing traditions, has long been shaped by the livelihoods of its small-scale fishers. In this community, where fishing is both a cultural identity and an economic necessity, the career aspirations of children from fishers' families are often influenced by familial and societal expectations (Ghani et al., 2017). Fishing has traditionally been seen as a viable, although challenging path that children are expected to follow. However, this case study seeks to explore how education, family dynamics, and economic hardships intersect to shape these children's career choices.



Figure 1. The fishing wharf, Kuala Perlis, 2025 © Authors

Through semi-structured interviews with two experienced teachers in Perlis with decades of teaching experience in schools within the region of Kuala Perlis, this study explores the socio-cultural environment of the region, the challenges posed by unstable economic conditions, and the role of the education system in influencing career aspiration of the children in the Kuala Perlis fishery community. The study highlights how the pressures of tradition and the attraction of more stable modern professions have led some children to seek alternative career paths, such as gig work or small business ownership, while others remain tethered to the family fishing legacy. Furthermore, the research investigates the role of teachers and school initiatives in offering these children a broader outlook on future careers, even as they face the barriers of limited opportunities and entrenched social norms.

Ultimately, the narrative presented here sheds light on the delicate balance these children must navigate – caught between the sea and school – as they envision their futures amidst the socio-economic realities of Kuala Perlis.

The socio-cultural and economic landscape of Kuala Perlis

Kuala Perlis resides a coastal community where fishing has long been the dominant livelihood, passed down through generations (Zaiton et al., 2019). The socio-cultural fabric of this area is intricately woven around the traditions of small-scale fishing, shaping the daily routines, beliefs, and aspirations of the local community. In such a context, family and community expectations weigh heavily on the younger generation, particularly the children of fishers.

“Fishing is not just a job; it’s a way of life here... and the children are often expected to follow in their parents’ footsteps.”

Respondent 2 (Primary school teacher)



Figure 2. The children of fishers on boat, Kuala Perlis, 2025 © Authors

This traditional livelihood is, however, fraught with economic instability.

Many families rely on unpredictable daily catches, and the income generated is often insufficient to provide long-term financial security (Ibrahim et al., 2023). Consequently, children from these families frequently face pressures to contribute to household income at an early age, compromising their educational pursuits.

Respondent 1, who has taught in secondary school Kuala Perlis, noted that about 10% of his students annually come from fishing families.

"They tend to be placed in the lower-performing classes... and they often face disciplinary issues, which I believe stems from the challenging environment they grow up in".

Respondent 1 (Secondary school teacher)

Respondent 2 shared a similar sentiment, revealing that:

"Many of the students from fishing families show little interest in academic achievements because their parents don't push them. They send their kids to school more out of obligation than expectation".

Respondent 2 (Primary school teacher)

Educational context and influence

In the educational sphere, the barriers to success are numerous for fishers' children. Their household environments are often not conducive to studying, with crowded living conditions and a lack of proper study spaces.

"Many of these children live in homes where space is divided by curtains, not walls, and they don't even have a desk to study at," Respondent 2 explained.

Respondent 2 (Primary school teacher)

Teachers have consistently observed that the lack of parental involvement

in their children's education further diminishes the students' drive to excel academically.

"Parents in these communities focus on survival, not education... education is secondary to the immediate need of contributing to the family's income."

Respondent 1 (Secondary school teacher)

Career aspirations of fishers' children

Despite these challenges, there are moments when the educational system intersects positively with the students' lives. Extracurricular activities, such as music and sports, often capture the interest of children who might otherwise disengage from formal education.

"Music, in particular, has been a gateway for some of these kids... Even the parents, who don't usually engage with their children's academic life, come out to support them during musical competitions."

Respondent 2 (Primary school teacher)

The influence of modernization and exposure to alternative career options plays a significant role in this shift.

"While fishing is still part of their identity, many of these children are beginning to see other opportunities as more desirable because they are less physically demanding and offer more stable income."

Respondent 1 (Secondary school teacher)

Yet, this movement away from fishing is not without its complications. Many children feel caught between tradition and the appeal of modern careers. Social pressures also play a role, as those who deviate from the fishing industry might feel alienated or judged by their peers.

“The pressure to conform is very real in these communities. If your friends are working in certain jobs, you feel the need to do the same.”

Respondent 2 (Primary school teacher)



Figure 3. Fisher family docking, Kuala Perlis, 2025 © Authors

While the community of Kuala Perlis remains steeped in its fishing tradition, children are beginning to explore other career paths, though these alternatives still tend to fall within the scope of low-skill, low-wage jobs. For these children to break free from the cycle of economic instability, concerted efforts from schools, teachers, and the community are essential. Programs that offer vocational training and exposure to a broader range of careers, coupled with parental engagement, could provide a pathway to more stable and fulfilling futures for the children of Kuala Perlis (Ariffin et al., 2023).

The role of the school and community

To the children in the fishing villages of Kuala Perlis, schools are not only a place to learn academics but sanctuaries of hope and possibility for children born into the cyclical hardships affiliated with fishing families. Despite a determined effort, though, schools struggle to make an inspiring, sustained impact on these children's career aspirations. Teachers and administrators have started all types of programs to steer career options, ranging from moral guidance and religious talks, to career-oriented activities such as gardening and carpentry.

However, such programs are usually met by apathy on the part of the children of fishers, which is bound to the comfort of immediate gain through physical labour. The appeal of joining their parents in the fishing industry tends to be greater than the more remote prospect of finding a more secure, or even rewarding, career, and this is instilled deeply into them by the traditions and economic realities of the community, as highlighted below:

"A lack of interest in education also causes them to be less involved or motivated to participate in the programs offered by the school. Therefore, although efforts have been made by the school, the impact on these children's career aspirations is somewhat limited."

Respondent 1 (Secondary school teacher)

Teachers act as mentors who provide practical advice suiting the strengths of students rather than just educating them. They inspire students by informing them to emphasize skill-based education that their children are interested in and become capable of performing and this will help them in facing the uncertainty in future.

"Music is one subject that strongly attracts students' interest, and I have seen how it influences their career thinking. For example, in singing competitions, parents offer extraordinary support, coming to decorate

their children and give them strong encouragement. The collaboration between parents and children in participating in music classes for competitions shows how influential music is in their lives...

...Activities like music provide students with opportunities to learn teamwork, cooperation, and self-confidence, even if they do not directly shape their careers in music. Our [teacher's] role is more about providing a strong foundation in life values, which will hopefully help them in whatever career they choose in the future."

Respondent 2 (Primary school teacher)

Clearly, teachers attempt to promote practical skills and discipline among kids through activities like music and other extra-curricular activities; however, they cannot do much about changing it as it is based on the general trend in society.

The small-scale fishing community of Kuala Perlis is conservative in its expectations, knowing the rhythms of fishing rather than the unknowable and unfamiliar outcomes of pursuing higher education. It is in this balance between the ambitions of the school and the realities of the community that a complex challenge greets those who would shape the futures of these children.

Barriers to career development

The impediments to career development for the children of Kuala Perlis' fishers are deep-seated and multi-faceted. Most urgently, perhaps, is the economic hold of poverty. Families of fishers habitually face financial instability that, from even a very tender age, burdens children to contribute to family income – a factor which limits their educational and career opportunities.

“Students who do not perform well or are not active in school activities often display a more passive attitude. They discuss career aspirations less frequently and are more inclined toward jobs that do not require higher education, such as part-time or manual work. Their attitude towards education is also more relaxed, with some viewing school as merely a place to fulfill basic requirements without having clear goals for the future. These differences are clearly reflected in how they face challenges and take initiative regarding available opportunities.”

Respondent 2 (Primary school teacher)

Moreover, the strained living in uncomfortably compacted quarters makes no provision for rest or space where focused study can take place; thus, these children grow up with reduced aspirations beyond the fishing boats.

Another source of significant problems is social dynamics within the community. In as much as the fishing community is closely knitted and strong in many ways, the same often presents its shortcomings in exposing people to broader career opportunities. The social circles of children reinforce traditional careers: their friends and family cannot and are not willing to support them in pursuit of attaining educational attainment. Harmful influences such as substance use add to these problems by attracting most of the children away from studying and into low-skilled work.

“One of the main challenges is their environment, which includes the influence of friends, family, and the community, who often do not provide adequate support for education and career development. Social pressure from peers and negative influences, such as involvement in substances like ‘Ketum’, are also major obstacles.”

Respondent 1 (Secondary school teacher)

Family expectations are not very contributive either. Most of the parents among these fishers never had enough education; therefore, they seldom dream about something big for their kids. For such parents, mere survival is utmost, and they consider education to be more of a luxury than a necessity.

This discouragement limits the motivation of the kids in pursuing their goals for a longer period, which leads them to manual jobs for some short-term vision.

It will take changes in attitudes at both the community and resource levels, including vocational training and mentorship, for these children to break free from interlocking barriers of economic hardship, social pressure, and family expectations that continue to hold them hostage.



Figure 4. Kampung Seberang Ramai a.k.a. The Rainbow Fisher's Village, Kuala Perlis, 2025 © Authors

A path forward: Recommendations and aspirations

In the quiet fishing villages of Kuala Perlis, where the sea meets the land and tradition intertwines with daily life, the future for many children is often as murky as the waters they grow up beside. As this case study unfolds, it becomes evident that the aspirations of fishers' children are shaped not just by the tides of their familial heritage but also by the limitations of their socio-economic environment. Yet, there is hope – and it lies in the concerted

efforts of schools, communities, and parents to provide broader horizons for these young individuals.

Teachers remain committed and help these children look beyond the fishing industry for career opportunities. Above all, moral support and constant encouragement are needed. As one teacher noted, *“reminding them that they can achieve success if they work hard and believe in their potential”* is essential in fostering the resilience necessary to explore alternative career paths.

However, beyond verbal reassurances, concrete steps need to be implemented. Programs offering personal vocational counseling in small groups may act as catalysts for these students. They will begin to see that their ambitions are not confined to fishing boats or their parents’ daily struggles. Consistent motivation, nurturing self-confidence, and raising awareness about the opportunities education can unlock are the key to their future success.

There is a pressing need to expose these children to vocational education. Due to economic and social constraints, many of these students may find formal academic pathways out of reach. Schools must collaborate with vocational institutions to create seamless transitions for those interested in skills-based careers, ranging from carpentry to technology and small business management. As one teacher indicated, *“without encouragement, they may remain stagnant”*.

Vocational and life skills programs tailored to the local context can provide students with practical skills aligned with the economic realities of their communities while also offering a way out of the poverty cycle. Investing in these programs not only offers alternative career options but also instills hope that life beyond fishing is both attainable and sustainable.

Parents, often focused on the immediate needs of the household, may unintentionally limit their children’s aspirations. Teachers noted that *“many don’t attend school because they have to help their parents,”* especially when family survival depends on every available hand. Changing this narrative requires a collective effort.

Parent-Teacher Association (PIBG) meetings must evolve from passive

listening sessions into active, solution-oriented discussions. Schools can lead this transformation by providing parents with training and workshops on how they can better support their children's academic and career development. Through such initiatives, the mindset of viewing education as a luxury rather than a necessity may begin to shift.

Additionally, the teachers we talked to suggest extending these efforts to the broader community. Organizing career talks, workplace visits, or inviting successful alumni from various fields can ignite curiosity and ambition among students.

As economic hardship remains a significant barrier for many families in Kuala Perlis, the financial pressures of daily life often take precedence over educational aspirations. Scholarships and financial aid, tailored for underprivileged students with potential, could be a game-changer. As such, schools could actively seek collaborations with external organizations to secure these resources, ensuring that no child's dream is deferred due to financial constraints.



Figure 5. Researchers meet the local children, Kuala Perlis, 2025. © Authors

Conclusion

The road ahead for the children of Kuala Perlis is challenging, but not impossible. By providing a strong support system, introducing practical vocational programs, engaging parents and communities, and addressing the financial hurdles that stand in the way, a brighter future beckons – one where career aspirations extend beyond the sea. In the words of our secondary school teacher respondent, *“even though they may choose different career paths, they still have a strong foundation in respecting others and maintaining good relationships with those around them”*. This foundation, built on respect and nurtured by education, is the bedrock upon which new aspirations can grow.



Figure 6. Scenic view of Kuala Perlis from the Tunku Syed Putra bridge,
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Small-Scale Fisheries Equity and Sustainability

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“Fishing isn’t just what I do and it’s who I am. Every sunrise on the sea, every wave that rocks my boat, reminds me that this isn’t just a livelihood. It’s a legacy, a calling that ties me to Mersing’s roots.”

Abstract

Small-scale fisheries provide livelihoods and food security for many coastal households in Malaysia, but fishers often operate under economic uncertainty, rising operating costs, and increasing pressure on nearshore resources. This chapter presents a case study of En. Yusof, a small-scale fisher from Mersing, Johor, to illustrate how policy support, market dynamics, and environmental change intersect in day-to-day fishing practice. Using a narrative case approach grounded in field observations and the fisher’s account, the chapter outlines fishing activities, the benefits and gaps

of government support programmes, key challenges (including fuel and maintenance costs, competition from larger vessels, and resource depletion), and practical recommendations for improving equity and sustainability in small-scale fisheries. All photographs in this chapter were taken by the author and are reproduced here with the fisher's permission.

Background

En. Yusof is a 56-year-old resident and a seasoned small-scale fishery from Mersing, Johor. He was born in 1968 and lives in Taman Nelayan, a government-subsidized housing area established specifically for fishers. This housing project reflects the government's efforts to support the fishing community, providing affordable accommodation for those dedicated to the industry. En. Yusof's roots in Mersing extend back generations, although his ancestry includes family ties to the east coast state of Terengganu. Many families in Mersing share a similar lineage, as people from Terengganu have migrated to this coastal town over the years in search of livelihood opportunities, forming a tightly knit community. En. Yusof completed his secondary education in 1985. Inspired to seek opportunities outside the traditional fishing industry, he enrolled in Politeknik Ungku Omar in 1986 to further his education. Unfortunately, financial constraints forced him to withdraw after only one year. Scholarship opportunities were limited, especially for individuals from lower-income fishing backgrounds. Without adequate financial support, En. Yusof faced the reality of setting aside his educational aspirations to support himself and his family.

En. Yusof's initial work experience began with a clerical role in accounting at Majuikan Sendirian Berhad (MSB), a subsidiary of the Lembaga Kemajuan Ikan Malaysia (LKIM). MSB was part of a state-led initiative aimed at restructuring the local fish distribution system. The goal was to reduce dependency on middlemen by establishing a central auction system, where fishers could sell their catch directly. This role allowed En. Yusof to gain administrative and financial management experience within the fishing sector. His career at MSB included a transfer to the LKIM headquarters

in Kuala Lumpur, followed by a posting in Kuantan, Pahang. These assignments broadened his understanding of fisheries management, offering him insights into national policies and administrative strategies intended to improve the livelihoods of fishers. After three years at MSB, En. Yusof moved to a privately owned company, KNI Sdn. Bhd (KNI), where he continued working within the fisheries sector, specifically in deep-sea fishing operations. KNI offered him exposure to the commercial side of fisheries management, involving private ownership of vessels and a focus on market-driven goals.

In a pivotal moment, En. Yusof made the decision to leave KNI and return to Mersing following his father's passing. Driven by a sense of duty to care for his elderly mother and younger siblings, En. Yusof felt the pull to reconnect with his roots and support his family in Mersing. One of the most significant challenges En. Yusof faced was the inability to continue his education due to financial constraints. Being from a fishing family, scholarship opportunities were scarce, and the costs of education were prohibitive. This forced him to abandon his studies and enter the workforce prematurely. En. Yusof's decision to become a full-time fisher upon returning to Mersing highlights a common phenomenon in Malaysia's coastal communities: the enduring pull of traditional livelihoods despite exposure to modern employment opportunities. His background and work experience with MSB and KNI equipped him with valuable skills, but his commitment to family and community ultimately led him back to fishing. He notes that the challenges faced by fishers in Malaysia are manifold, from economic instability to the difficulties posed by a middleman-dependent distribution system. Yet, for En. Yusof and many like him, the cultural heritage of fishing and the satisfaction derived from supporting their communities outweigh the obstacles.

Fishing activities

En. Yusof and his peers in Mersing utilize specific types of boats and nets designed to meet the demands of small-scale, nearshore fishing activities. Boat for zone A: a relatively larger boat that provides more stability and capacity, accommodating the equipment and catch needed for nearshore fishing. While it doesn't allow for deep-sea fishing, Boat A is versatile and fits the operational needs of the community, enabling them to focus on nearshore waters without requiring extended trips. The traditional fishing boat *Sampan* made of fibre glass and widely used use by small scale traditional fishers. It is smaller and more easier to navigate in shallow coastal waters and is preferred by those who do not venture far from the shore. The *Sampan* represents a cost-effective and manageable option for small-scale fishers, aligning with their preference for shorter, day trips rather than extended fishing excursions into deeper waters.

Regarding nets, En. Yusof and his peers mainly use traditional fishing nets, which serve their purposes well but require regular maintenance and occasional replacement. Financial constraints often impact their ability to maintain nets, and when nets wear down, they develop larger openings, allowing smaller fish and crabs to escape. This reduces the effectiveness of their catch, highlighting the importance of having sufficient funds for upkeep. As En. Yusof always emphasizing how aging nets can lose functionality over time. When they have adequate funds, they upgrade to newer nets with tighter meshes, which significantly improve their yields by retaining more fish. These choices in boats and nets reflect the adaptive strategies employed by small-scale fishers in Mersing to balance their operational limitations with the demands of sustainable fishing.

Government's support and its positive impacts on small-scale fisheries

The Malaysian government, recognizing the vital role of small-scale fisheries in supporting local economies and preserving traditional livelihoods, has introduced several subsidy programs and initiatives through agencies like LKIM to assist fishers. For En. Yusof and his peers, these supports are crucial in mitigating some of the operational and economic challenges that have intensified over the years. This section elaborates on the specific types of aid provided, the structures in place for subsidy distribution, and the impacts of these programs on local fishing communities.

Fuel subsidies and financial assistance

One of the primary forms of financial support provided to small-scale fishers is fuel subsidies. In Malaysia, fuel costs constitute a significant portion of operational expenses for fishers, as fuel is necessary to power boats and operate equipment. Through the fuel subsidy program, the government allocates a specific amount of subsidized diesel and petrol to registered fishers each month. This program is managed by LKIM, which works closely with fishers' associations to ensure equitable distribution. En. Yusof explains that this subsidy has helped him and others to reduce their overall fuel expenses, allowing them to allocate more funds toward other essential operational costs, such as boat maintenance and equipment repair. However, he notes that fuel subsidies are insufficient given rising costs, emphasizing the need for these subsidies to be adjusted to reflect current inflation rates. En. Yusof also noted that such assistance eases day-to-day financial pressure, but he also emphasized that rising costs for maintenance, gear, and household needs can erode the overall benefit over time (Ministry of Finance Malaysia, 2025). As fuel prices and overall living costs continue to rise, fishers face increasing pressure, and their income is insufficient to cover the difference. In addition to fuel subsidies, there are also general financial assistance programs that provide fishers with occasional grants or

allowances to help during challenging times, such as during the monsoon season when fishing is restricted. These programs, managed by both federal and state governments, are particularly beneficial for small-scale fishers, who are most vulnerable to income fluctuations due to their limited access to alternative income sources.

Housing initiatives and community development projects

Recognizing the need for stable living environments for fishers, the Malaysian government has invested in housing projects designed specifically for fishing communities. En. Yusof is a resident of Taman Nelayan, a community housing project that provides affordable housing to fishers and their families. He describes that such projects offer not only affordable housing but also a sense of stability and community cohesion among residents. These housing project initiatives must be continued as they serve multiple purposes. They provide affordable, durable housing close to fishing areas, allowing fishers to have easy access to their work sites. They also foster a supportive environment where fishing families can build networks, share resources, and support one another through the unique challenges of the fishing lifestyle. Moreover, these communities enable the preservation of traditional practices, as families are more likely to pass down fishing knowledge within these tight-knit groups.

Fisheries resource allocation and zoning regulations

The Malaysian government, through LKIM and related agencies, has introduced resource allocation and zoning policies to regulate fishing activities and preserve marine resources. These policies are designed to protect small-scale fishers by allocating certain coastal zones exclusively for their use, thus restricting larger commercial and foreign vessels from fishing in these areas. This zoning is intended to prevent overfishing and ensure that

local fishers have sustainable access to marine resources. However, En. Yusof mentions that the current policies do not help local fishers, as large boats still dominate. While zoning policies exist, he notes that enforcement remains inconsistent, and larger boats frequently encroach on these protected zones. This lack of regulation undermines the efforts to protect local fishers' access to resources. En. Yusof believes that stricter enforcement of zoning laws would be instrumental in ensuring that small-scale fishers like himself can continue to operate sustainably. The government has also issued fishing licenses that specify the types of fishing permitted in certain areas, differentiating between small-scale and industrial operations. While this licensing system is meant to manage fish stocks and limit environmental impact, local fishers feel that enforcement could be strengthened. For En. Yusof, better monitoring and regulation of fishing zones would not only reduce competition but also contribute to the replenishment of fish stocks, benefiting the entire community. In practice, En. Yusof perceived enforcement to be uneven. He reported that larger vessels sometimes enter areas typically used by small-scale fishers, and he linked this to weaker monitoring and inconsistent action. When enforcement is uneven, zoning rules lose credibility and small-scale operators face greater competition and safety risks (Southeast Asian Fisheries Development Center, 2022).

Training programs and sustainable fishing practices

To support fishers in adapting to industry changes, the government and NGOs provide training programs focused on sustainable fishing practices, resource management, and alternative income sources. These programs are intended to equip fishers with the knowledge and skills to diversify their livelihoods and adopt more eco-friendly methods that protect marine ecosystems. For older fishers like En. Yusof, adapting to new practices can be challenging. He says, emphasizing that while these training programs are helpful, they should be tailored to accommodate the specific needs and experiences of older fishers. Programs that focus on accessible, practical training could have a greater impact, enabling fishers to maximize their

earnings while adhering to sustainable practices. In addition to sustainable practices, these training programs often cover topics such as basic financial management, equipment maintenance, and safety protocols, which help fishers enhance their operational efficiency and personal safety. He noted that training can improve operational efficiency and safety awareness, especially when it is accompanied by follow-up support rather than delivered as a one-off event (Islam & Nayak, 2025). The government also collaborates with NGOs to provide workshops and community support, which further strengthens local fishers' ability to manage resources effectively.

Social welfare and disaster relief funds

As a safety net for fishers, the government has introduced social welfare programs and disaster relief funds to assist fishers during natural disasters or emergencies. These funds are managed by LKIM, which provides financial assistance in the event of accidents, boat damage, or severe weather events that hinder fishing activities. For fishers like En. Yusof, who are exposed to high-risk conditions at sea, these funds offer a level of financial security. During the monsoon season, when fishing is limited, the government sometimes provides additional allowances to help fishers sustain themselves and their families. While these allowances do not fully cover the income lost, they provide essential support during periods of financial strain. En. Yusof appreciates this form of assistance, though he believes that it could be expanded to offer more comprehensive support during these non-fishing months.

Protection against any unfortunate events as a result of a death or an accident is very important among small-scale fisheries in Malaysia, including En. Yusof. It is provided primarily through policies managed by the Fisheries Development Authority (LKIM) and certain insurance providers. According to En. Yusof, the information of the coverage is unclear, the coverage is limited and has raised several concerns among the fishers. Occupational safety and health risks among fishers have been documented in Malaysia, underscoring the need for effective protection mechanisms (Saadon et al.,

2023). Here is a deeper examination of the available insurance options and their limitations:

Types of coverage

1. Accident and death insurance coverage: Insurance policies available to fishers generally cover specific incidents such as accidental death and critical illness. For example, coverage typically includes death due to workplace accidents, offering compensation to the family of the deceased. The insurance only covers three things: death, critical death, and disability. While this basic coverage provides some support, it leaves out broader health and accident benefits, especially those that could cover smaller injuries and less severe incidents that still impact a fishers' ability to work.

2. No minor injury coverage: Minor injuries sustained during fishing operations have no coverage under the current insurance policy. Fishers mentioned the need for more inclusive coverage that would account for selected minor injuries, which often occur due to the hazardous nature of fishing.

3. Funeral expense benefit: Contributions to welfare funds or funeral expense are also a part of the insurance structure for fishers. The welfare benefits are deducted from their income and meant to provide basic support in cases of death. However, the benefits of these contributions, which is referred to as funeral expense often unclear to fishers, and many feel inadequately informed about what these deductions actually cover.

In addition to this, there are several key issues with the current insurance coverage as follows:

Lack of transparency: A major complaint among fishers is the lack of transparency regarding the terms of their insurance coverage. Fishers, including En. Yusof. He feels uncertain about what is covered, which leads

to confusion and dissatisfaction when claims are processed. They often find that policies do not provide the comprehensive protection they need. This ambiguity causes mistrust and reluctance to depend on these policies.

Inadequate communication and policy clarity: The insurance providers, have limited interaction with the fishers, which contributes to misunderstandings about the scope of coverage. Many fishers shared that they were not adequately informed about policy details upon enrolment. Issues such as eligibility requirements and specific claim processes are not clearly explained, leading to further confusion during the event of claims processing.

Complicated claim processes: Fishers also report challenges in processing claims. Documentation requirements for claims related to accidents or death are often complicated, requiring extensive paperwork and proof, which can be difficult to provide in remote fishing communities. This barrier means that some fishers, after an incident, may not receive the full benefits of the coverage they believed they were entitled to.

Inadequate coverage for illnesses and long-term disabilities: The current insurance policies primarily cover death and critical illness but do not extend to specific accidents or long-term disabilities.

Issues and challenges

Financial strain due to rising costs: En. Yusof points to the increasing cost of maintaining boats and fishing gear as a significant barrier, which inflation has only exacerbated. He notes, “*previously, we could afford supplies. Now, inflation has raised prices on everything, We can’t keep up with maintenance. It’s not that fish are unavailable, they are, but the increase on the maintenance doesn’t match our income*”, This imbalance has forced local fishers to compromise on equipment quality, affecting their productivity. In addition, it is also a pattern also reflected in recent Malaysian coastal research on small-scale fishers’ cost pressures (Bamasood et al., 2025).

Competition with larger and foreign boats: En. Yusof reflects on how the influx of larger and foreign fishing vessels has impacted local fisheries. He explains, “*they’re advanced and developed, so their yields are high, driving down fish prices. Even when prices rise, it’s not proportionate to our costs*”. The entry of technologically equipped boats means that traditional fishers struggle to compete, as larger operators can access and exploit resources more extensively.

Subsidy model ineffectiveness: According to En. Yusof, government subsidies should incentivize productivity. He suggests that the government should follow fish output. If it is higher, the subsidies should be increased. He sees this approach as a potential motivator for fishers to work harder. However, the current subsidy model does not account for individual production levels, which he believes limits its effectiveness in encouraging sustainable growth.

Environmental concerns and resource depletion: En. Yusof also observes that resource depletion has made fishing increasingly difficult. The overfishing and environmental degradation caused by unrestricted fishing activities have forced local fishers to venture further out, increasing their operational costs. He emphasizes that, “*before this, fish were close by, we didn’t need to go far. Now we have to go farther as nearby spots don’t yield as much*”, echoing broader discussions of well-being challenges in Malaysian small-scale fisheries where ecological pressures interact with livelihoods (Islam & Nayak, 2025).

Foreign labour in local fisheries: Another challenge is the encroachment of foreign operators who, as En. Yusof mentions, the presence of foreign fishers, often operating outside regulations, impacts the catch of local fishers, further exacerbating resource scarcity.

En. Yusof’s insights provide a comprehensive picture of the socio-economic and environmental pressures facing small-scale fisheries in Mersing. His suggestions focus on a more supportive subsidy model, regulation of foreign

competition, and targeted financial support to sustain this traditional industry. This aligns with evidence on socio-economic well-being challenges reported among fishing communities in Johor (Zamri & Abdullah, 2021).

Recommendation

Meanwhile, En. Yusof did offer his suggestions to further improve the subsidy and financial assistance programs for small-scale fisheries as follows:

1. **Linking subsidies to production:** He suggests that subsidies should be dynamically tied to fish production levels, where increased fish output results in higher subsidies. This approach aims to motivate fishers to increase their yields, as the additional production would directly impact the financial support they receive. He views this as a performance-based structure that encourages hard work and increases the productivity of local fisheries.
2. **Implementing a FELDA-like loan model:** Drawing on the FELDA model, En. Yusof proposes a structured loan system specifically for fishers. Under this model, fishers could receive sufficient loans for critical expenses, such as boat and engine repairs, with the repayment deducted from their subsidies or profits over time. This would reduce the immediate financial burden on fishers and allow them to sustain their operations without heavy upfront debt. He believes that such a system could address the gap in affordable financial support for essential equipment maintenance.
3. **Targeted assistance for traditional fishers:** En. Yusof emphasizes the need for financial support tailored to the specific needs of small-scale and traditional fishers. Rather than high-tech solutions, which are often costly and unsuited to their work, he recommends grants or equipment subsidies for basic necessities, such as fishing nets and boat repairs. This would make government support more effective by directly addressing the operational challenges faced by local fishers.

4. Enhancing youth engagement: En. Yusof is concerned about the dwindling interest among young people in fishing careers. He suggests that improving subsidies and making financial assistance more appealing could draw younger generations into the industry. By restructuring subsidies to offer incentives for increased productivity and establishing accessible loan systems, the government could make fishing a more viable career path for youth, thereby ensuring the continuity of the local fishing community.

En. Yusof's suggestions has reflected a desire for a subsidy model that is both adaptive and supportive, aiming to align financial assistance with the actual needs and challenges of traditional fishers in Mersing, Johor.

Conclusion

The case study of En. Yusof provides an insightful overview of the complex socio-economic and operational challenges faced by small-scale fisheries in Mersing, Johor. As a seasoned fisher, En. Yusof has highlighted key obstacles, including rising costs of equipment maintenance, competition from advanced foreign vessels, insufficient government subsidies, and a lack of interest among the younger generation in pursuing fishing as a career. Through his recommendations, En. Yusof suggests a path forward to enhance the sustainability and viability of small-scale fisheries. He advocates for performance-based subsidies that would reward higher productivity, allowing fishers to benefit financially as their yield increases. This model could serve as an incentive for fishers to work harder and would align financial assistance with actual production. Additionally, En. Yusof proposes a structured loan system similar to the FELDA model, where fishers could access necessary funds for boat and engine repairs without the immediate financial burden, promoting long-term stability.

He also emphasizes the need for stricter regulations to curb the encroachment of foreign and large-scale fishing operators, who frequently impact local resources. This, coupled with financial support tailored to the specific needs of small-scale fishers, would help protect local

livelihoods and ensure that traditional fishing grounds remain accessible to the community. Finally, En. Yusof stresses the importance of fostering youth interest in fishing by improving the industry's economic viability and introducing training and financial support programs that showcase fishing as a sustainable career. This case study demonstrates that while small-scale fisheries face significant challenges, there are feasible solutions rooted in policy adjustments, community support, and environmental stewardship. En. Yusof's insights highlight the importance of targeted assistance and adaptive policies in preserving the traditional fishing community in Mersing, ensuring both economic resilience and cultural continuity for future generations. Recent research on interventions such as artificial reefs further indicates that policy and ecosystem measures can have meaningful socio-economic implications for fishing communities when they are designed and implemented effectively (Sapehee et al., 2025).



Figure 1. En. Yusof (left) and his worker (right). Pusat Perikanan Mersing, Johor, 2024 © Wan Mohd Fadhlán Bin Wan Azmi



Figure 2. En. Yusof (Left) and his boats (Right). Pusat Perikanan Mersing, Johor, 2024 © Wan Mohd Fadhlán Bin Wan Azmi

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Do Subsidies Benefit Small-Scale Fisheries in Malaysia?

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Introduction

Subsidies in fisheries can improve sustainable fisheries and contribute to the well being of fishers if it leads to better management of fishing effort and harvesting methods. However, subsidies often result in the modernization of fishing vessels, increase in catches and fisheries depletion, thus leading to unsustainable fisheries. The important issue is that subsidies reduce the cost of operation or make the operation more efficient and they generally motivate fishers to employ more fishing pressure, making it difficult to attain sustainability and conservation goals in fisheries. Fisheries subsidies can be categorized as beneficial, capacity enhancing or ambiguous. Beneficial subsidies include programmes that lead to enhanced natural capital such as fish stocks, capacity enhancing subsidies lead to overexploitation and make the fisheries unsustainable, while the impacts of ambiguous subsidies are undetermined.

Malaysia is a signatory to the RIO plus 20 Declaration and a member of Asia Pacific Economic Cooperation (APEC) and the World Trade Organization (WTO), which seek to eventually eliminate subsidies as they can contribute to overcapacity and overfishing (Viswanathan et al., 2013). Fisheries subsidies have important implications on the ecological sustainability and socio-economic development. The evidence from studies suggests that subsidies, if effectively utilized, can improve resource conditions and livelihood of those who depend on the resource (OECD, 2003). The problem of overcapacity and overfishing due to subsidy has been highlighted at various high level international forum. Generally, subsidies are provided directly to the fishers in the form of fuel and non-fuel items. The effect of fuel and non-fuel fisheries subsidies on fisheries resources and wellbeing of fishers is difficult to measure. In Malaysia, fisheries subsidies include fuel subsidy, monthly allowance, catch incentives, fishing equipment, and other investments in infrastructures for fisheries development (Viswanathan et al., 2013). The positive contribution from subsidy towards resource conservation and livelihoods of fishers has important policy implications for livelihoods of coastal fishing communities in Malaysia. However, studies on the impacts of subsidy on resources and fishers wellbeing in Malaysia have not been undertaken.

Fisheries subsidies in Malaysia

In Malaysia, the government introduced fisheries subsidy programmes in the early 1970s through a poverty eradication scheme for small-scale fishers. Under the programme, the government provided direct assistance to enhance livelihoods of small-scale fishers. The government introduced fuel subsidy programme in 2008, through which all licensed fishers were entitled to receive the fuel subsidy. In Malaysia, government spent about RM 715 million on fisheries subsidies in 2012 (EPU, Malaysia, 2013). Fuel subsidy accounts for 67% (RM 474 million) of total subsidy in 2012. Generally, fuel subsidies are viewed as bad subsidies as they contribute to capacity enhancement in the fisheries. The major fuel subsidy recipients were the

small-scale fishers who comprise over 70% of the total fishers in Zone A where fishers are allowed to fish in the nearshore area up to 7 nautical miles from shore.

The small scale fishers receive diesel subsidy, living allowance which accounts for 24% of the total subsidies (RM 172.8 million in 2012). The government has increased the living allowance for fishers operating in zone A from RM 200 to RM 300 per month in 2015. The fishers in larger boat (zone B and C – fishing in the deep sea) receive the living allowance of RM 250. All licensed fishers are entitled to receive fish catch incentives: RM 0.10 per kg for boat A and B and RM 0.20 per kg of catch for zone C boats. The impact of subsidies should be examined to understand whether the poor fishers can improve their wellbeing through fuel and non-fuel subsidies. The limited studies on fisheries subsidies in Malaysia provides the backdrop for undertaking this study, whose objective is to evaluate the socio-economic and environmental impacts of fisheries subsidies in Malaysia.

Case study in Langkawi

The study was conducted in the states of Kedah, Selangor and Terengganu in Peninsular Malaysia. The fishery in these area is mainly characterized by small-scale artisanal fishers with very low catch relative to large-scale commercial fishers (boat B and C). Fishers rely mostly on fishing for their livelihood, with limited access to other employment. The data for this study were obtained from face-to-face interviews with fishers using a structured questionnaire. Prior to field data collection, focus group discussions were conducted to obtain insights on fishing practices, gear used, fishers' income and expenses. Respondents were randomly selected from the list of boats A, B and C operators. The average monthly income from fishing was derived by deducting the day-to-day operational costs of a fishing vessel, which consist mainly of fuel, ice, food and bait. Fishing income was computed by catch per trip. The study used descriptive statistics to analyze impact of subsidies on the income of fishers by different category of fishing boats.

Results and discussions

The sample respondents covered three category of fishing boats, boat A, boat B and boat C operating their gear in their respective fishing zone. Among the respondents, 74% were interviewed from zone A, 19% from zone B, the remaining 7% were interviewed from zone C. The mean engine horse power is 36.2, 238.7 and 364.6 for the respondents operating in zone A, zone B and zone C respectively (Table 1). The results show that the artisanal small-scale fishers use significantly low powered engine compared to the boat used by commercial fishers.

Table 1. Average engine capacity (horse power), fishing effort and catch by vessel type

Boat Type	Sample	Average HP	Fishing Hour/month	Catch kg/hour
Boat A	182 (74)	36.24	156.7	8.07
Boat B	47 (19)	238.70	247.3	96.75
Boat C	17 (7)	364.58	352.7	128.49
All	246	94.43	183.8	35.12

Fishing effort

Fishing effort was calculated based on the number of hours spent per fishing trip per month by type of boats, which shows that the fishers from zone A spent 157 hours per month on fishing, while the commercial fishing boats (boat B and boat C) spent relatively more fishing hours on fishing (Table 1). The results indicate that fishing effort of small-scale fishers was significantly different from other commercial fishing boats. Average fish catch per hour of fishing effort show that boat zone B were able to catch 12 times higher catch compared to boat A (Table 1). Catch per hour for zone A boat was significantly different from commercial boats. The difference in fishing effort between boat zone A and other commercial boats was relatively less:

1.6 (boat B) to 2.2 (boat C) times, while the difference in fish catch was 12 times to 16 times higher compared to boat A. This indicates that the relatively low powered boats operating in zone A were less efficient compared to the larger engine powered boats.

Operational expenses

The results show that the respondents spent more than 70% of total operational cost for fuel use (Table 2). Food at sea is the second highest cost spent by zone A fishers, while the larger vessels (boat C) spent relatively higher for ice. The results also show that the quantity of subsidized fuel was not adequate. Majority of the respondents from boat A obtained additional fuel with a monthly value of RM 66 from open market, while half of the respondents from boat zone B obtained additional fuel with a value of RM 1,340 from outside (Table 2). The results indicate that some larger commercial boats (boat zone B and boat C) had to spend more for additional fuel from outside in order to operate fishing (Table 2).

Table 2. Average fishing effort, operational expenses and fuel use

Fishing operation	Boat A		Boat B		t-statistics
	Mean	Std. dev	Mean	Std. dev	
Operational expenses (RM/per month)	2,213.1	4832.9	14,955.3	21436.9	8.5***
Fishing effort (hours/month)	156.73	82.89	247.32	144.52	5.6***
Fuel obtained from open market (RM/month)	66.09	159.16	1,338.85	3026.57	5.7***

Note: *** significant at 1% level

Income from fishing

Monthly average fishing income for small-scale fishers was RM 3,798, the income for group B was RM 25,989 and RM 16,125 for the boat C. The results show that income for the boats operating in zone A was significantly lower compared to other boats. The results indicate that the larger boats were able to invest in fishing equipment that substantially increased catch and income. The evidence suggests that the larger powered boats (boat B) could capture major benefits from fisheries. Overall, it seems that there is inequitable distribution of benefits in fisheries. The small-scale fishers have failed to increase substantial income from fisheries subsidies. The results supports other study finding in Malaysia, where it was found that the catch per unit of effort (CPUE) was significantly higher for purse seing gear (boat B and C) but the productivity was relatively low compared to other traditional gear and trawls.

Benefits from subsidies

Majority of the respondents from boat A obtained an average of RM 416 per month from livelihood subsidies, cash aid (Bantuan Rakyat 1 Malaysia, BRIM) and catch incentives, while the larger boat (boat B and C) respondents received average RM 948 per month. The respondents were asked about their views on the impact of fisheries subsidies for their livelihoods. Majority of the small-scale fisher respondents agreed that subsidy has contributed to increase their income. However, 55% of respondents reported that their increased income was not adequate to meet their daily expenses (Table 3).

About 66% of respondents from boat A agreed that government subsidy has contributed to their wellbeing as fishing is the only livelihood option for almost all fishers in the coastal areas in Malaysia. Some alternative income generating programmes should be created to enhance livelihoods for the small-scale fisheries households. Creation of non-fishing economic activities is required. These activities could be in the tourism area or in the processing of artisanal products. This may reduce fishing effort and

dependency on fishing activities. Diversification of livelihood options could improve fishers income and wellbeing as in other countries such as Bangladesh (Islam et al., 2014). Their perceptions about fishing effort show that fishers of both A and B zones have been encouraged to go out to fish more days. The result supports the evidence that fuel subsidy has reduced fishing operational costs. The important results of this study suggests that subsidy has attracted fishers that lead to increase fishing competition. Fisheries subsidies are benefiting the artisanal fishers but competition for fishing create pressure on the resource and the small-scale fishers were not able to capture benefits from fishing. These problems cannot be reduced by elimination of subsidy, but effective planning and designing of subsidy programmes may improve the well being of fishers in Malaysia.

Table 3. Respondents perception about benefits from subsidy

Contribution of Subsidy	Boat A	Boat B	Boat C	All
Income increased to support family expenditure				
Enough	45.1	63.0	70.6	50.2
Not enough	54.9	37.0	29.4	49.8
Contributed to increase income				
Enough	62.5	46.8	50.0	58.6
Not enough	37.5	53.2	50.0	41.4
Contributed to remain in fishing				
Yes	65.7	46.8	41.2	60.3
No	34.3	53.2	58.8	39.7
Contributed to increase access to household assets				
Enough	61.5	46.8	58.8	58.2
Not enough	38.5	53.2	41.2	41.8
Subsidy encouraged to go out to fish more days				
Yes	59.7	59.6	46.7	58.8
No	40.3	40.4	53.3	41.2

Conclusions and policy recommendations

There is a growing recognition that sustainability of fisheries is critical for the economic benefit of the fishers. Subsidies create excess capacity due to reduction of fishing operational cost. In Malaysia, fisheries subsidy were introduced in 1970s in the form of direct livelihood support to the poor

fishers. Fuel subsidies were introduced in 2008 and have become a major component of fisheries subsidy. The results of the study shows that majority of the fishers from boat A were able to derive benefits from fuel and non-fuel subsidies. However, the larger boats, boat B and C, were able to capture maximum benefits from fishing while fuel subsidy from government was the main factor for economic benefit for both small-scale and large-scale fishers. The results suggest that current subsidy programme may not be an effective strategy for economic improvement of artisanal fishing communities in Malaysia.

The relatively larger boats (boats A and B) were able to derive substantial benefits from fishing, while the artisanal fishers failed to compete with the larger boats. There is a need to have a clear strategy for resource management to prevent overfishing due to fuel subsidy. Fisheries resources have been overexploited due to lack of effective implementation of fisheries rules. More enforcement and community education on fisheries regulations are needed to improve the fisheries. Given the current fisheries management, it would be difficult, both socially and politically, to remove subsidies from fisheries. The government should prioritize the implementation of alternative employment activities that may improve fishers' welfare and enhance fisheries resources.

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The Tale of Rudy, a Mukah Fisher in Sarawak

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Introduction

Rudy Sebli Ayak is 53 years old and has 4 sons and 2 daughters. He lives in the quaint coastal town of Mukah, nestled along the serene waters of Sarawak. Rudy is a fisher with a heart as vast as the sea, who has been engaged in fishing for generations. His family had relied on the bounty of the ocean, casting their nets into the azure depths to pull out their sustenance and livelihood. Rudy carried on this proud tradition with a blend of modern techniques and ancient wisdom passed down from his forefathers.

Every morning, just before dawn, Rudy would head out to sea in his weathered wooden boat, the 'Sejahtera'. The boat, a gift from his late father, was more than a vessel: it was a repository of memories, echoing the tales of countless fishing expeditions and the whispering winds of the South China Sea.

However, in recent years, the once-abundant catches had dwindled, causing worry among the fishing community. Overfishing and illegal trawling had taken a toll on the marine ecosystem, leaving the waters sparse and the fishers struggling. Rudy found himself returning home with empty nets more often than he'd like to admit, his heart heavy with the uncertainty of the future.

The struggle to make ends meet was palpable. On a good day, Rudy could earn around RM 100, but there were many days when he made much less. The fluctuating income made it difficult to provide for his family, and the rising costs of maintaining his boat and equipment added to the burden. The life of a fisher was inherently tough, marked by long hours, unpredictable weather, and the constant danger of the open sea.

Change came with the introduction of the Sarawak government's reef ball project. News spread quickly through the village, and hope kindled in the hearts of the fishers. The project aimed to restore marine habitats and boost fish populations by deploying thousands of specially designed reef balls along the coast.

Skeptical yet hopeful, Rudy attended a community meeting where officials explained the benefits of the reef balls. They promised that these structures would create new habitats for fish, prevent illegal trawling, and ultimately lead to a more sustainable fishing industry. Rudy's skepticism began to wane as he listened to the success stories from other regions where similar projects had been implemented.

With cautious optimism, Rudy and his fellow fishers watched as the first batch of reef balls was submerged into the waters off Mukah. Weeks turned into months, and the change was palpable. Rudy's nets started to fill again, not just with the usual catch but with a variety of marine life that hadn't been seen in years. The artificial reefs were working, attracting fish and other sea creatures to their new habitats.

One particularly memorable day, Rudy set out on the *Sejahtera* just as the first light of dawn kissed the horizon. As he cast his nets, he couldn't help but feel a sense of anticipation. Hours later, when he pulled them in, they were teeming with fish. His catch included not only the staple species but

also a few rare ones, a testament to the rebounding health of the marine ecosystem.

Back on shore, the atmosphere was festive. The market buzzed about the project that had not only revitalized the sea but had also breathed new life into Mukah's fishing industry. Rudy and his peers were now advocates for sustainable fishing practices, understanding the importance of preserving their precious marine resources for future generations.

As the sun set over the horizon, painting the sky in hues of orange and pink, Rudy reflected on the journey. He realized that while the sea was unpredictable and often harsh, it also had the with activity as fishers displayed their bountiful hauls. The once-struggling community was thriving again, and there was a renewed sense of pride and hope. Rudy, standing by his boat, couldn't help but smile as he thought of his father. He knew that the old man would be proud of the resilience and adaptability of their family and their community.

The artificial reef delivered on its promise of capacity for renewal and abundance. With a heart full of gratitude and nets full of fish, Rudy looked forward to the future, ready to embrace whatever the tide would bring.



Figure 1. Rudy Sebly Ayak. Mukah, Sarawak, 2025 © Shelley Sebli

Mukah, a coastal town in Sarawak, Malaysia, has a vibrant fishing community that has seen significant developments in recent years. Various initiatives and events highlight the importance and challenges of the fishing industry in this region.

One key development is the artificial reef ball project, which has substantially boosted the local fish population and fishers' catches. This project, recognized as the world's longest artificial reef, spans 746 kilometers and has led to a threefold increase in catches for fishers in Mukah and Kuala Rajang. The reef balls provide habitats for marine life and help prevent illegal trawling, thus supporting sustainable fishing practices and enhancing local fishers' income from around RM 100 to RM 300 per day (DayakDaily, 2021) (The Borneo Post, 2021).

The deployment of additional artificial reefs near the Mukah River estuary and Penipah sea is expected to further improve fish stocks and restore habitats affected by trawling. These efforts are part of a broader strategy to enhance the economic prospects of coastal communities by promoting both commercial and recreational fishing (New Sarawak Tribune, 2021).

Despite these positive changes, the fishing community in Mukah faces challenges, such as incidents at sea. For instance, a tragic event in 2022 involved a capsized boat that led to a large-scale search and rescue operation, underscoring the risks faced by fishermen (The Vibes, 2022).

Mukah's seafood market remains active, even during restrictive periods like the Movement Control Order (MCO). Local fishers continue to supply fresh seafood to markets, ensuring the community has access to reasonably priced fish, despite operational constraints (New Sarawak Tribune, 2021).

Overall, the fishing industry in Mukah is undergoing significant improvements through innovative projects and sustained efforts to support local fishers, contributing to both their economic wellbeing and the sustainability of marine resources.

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Born in Kuala Penyu, Sabah, Malaysia, a coastal district surrounded by the sea and rich marine resources, I grew up in a community closely connected to nature and traditional livelihoods. During my teenage years, I was actively involved in the fish industry and local marketing activities, gaining early exposure to practical business operations, supply chains, and community-based economic systems. I later pursued a career in civil engineering and have served in the profession for nearly 30 years. Throughout my career, I have been deeply engaged in Sabah's water resources sector, contributing to a wide range of technical and management initiatives. My core areas of work include flood mitigation planning, drainage and irrigation system design, river management, and water resources conservation. I have participated in multidisciplinary projects that integrate engineering, environmental protection, and public safety objectives. My professional journey reflects a long-standing commitment to infrastructure resilience, environmental stewardship, and effective water governance for the benefit of communities and future generations.



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Dr. Farhana Tahmida Newaz is Associate Professor at Universiti Tun Abdul Razak (UNIRAZAK), Malaysia. She earned her PhD in Marketing from Victoria University of Wellington. She holds an MSc in International Business from Gothenburg University. Prior to joining UNIRAZAK, Dr. Farhana was involved in teaching undergraduate courses at two universities in New Zealand and Bangladesh. In addition to teaching, she is a regular contributor to international conferences as a reviewer. Dr. Farhana collaborates with international researchers and has co-authored articles published in international journals and presented at conferences. Her current research interests are in the area of Muslim religiosity and buying behaviour on which she completed her PhD from Victoria University of Wellington.



Raymie Nurhasan

Raymie Nurhasan is the Fisheries Lead at WWF-Malaysia, with more than 10 years of experience designing and leading sustainable fisheries programmes. He oversees and supports initiatives including Fisheries Improvement Projects (FIPs) and Small-Scale Fisheries Projects (SSFs), working with government agencies, industry partners, universities, and coastal communities to strengthen fisheries governance, improve data systems, and address overfishing threats. His work bridges applied science and implementation, including the development of practical management tools and pathways that advance inclusive co-management and community stewardship in priority seascapes. Raymie also contributes to national and regional policy processes, providing technical inputs to strengthen sustainability elements in fisheries management and to support alignment with broader biodiversity and ocean strategies. Alongside his professional role, he is a PhD researcher focusing on the population dynamics and stock assessment of reef fishes in Tun Mustapha Park, Sabah, using length-based approaches to inform harvest strategies and harvest control rules in data-limited tropical fisheries.



Chin Nurhiqwanalina

Chin Nurhiqwanalina Henry Chin is a Fisheries Improvement Officer with WWF-Malaysia, focusing on sustainable small-scale fisheries in the Tun Mustapha Park, Sabah. She holds a Bachelor of Science (BSc) in Marine Science, supporting her work in fisheries assessment and community-based monitoring. Her role includes strengthening citizen-science data systems and working closely with communities, government agencies, academic partners, and regional networks. She is particularly interested in community empowerment, science-driven decision-making, and enhancing regional collaboration for sustainable fisheries.



Siti Zainab Omar

Siti Zainab Omar currently serves as a Fisheries Improvement Officer at WWF-Malaysia, leading Sustainable Fisheries Initiatives (SFI) focused on the Yellowfin Tuna Fishery Improvement Project (FIP) and small-scale fisheries management within the Semporna-Darvel Bay Seascape. She holds a Bachelor of Science (Hons.) in Marine Science from Universiti Malaysia Sabah (UMS). Her interests centre on sustainable fisheries management, marine conservation, community empowerment, and strengthening fishery governance through science-based approaches. She aspires to pursue a MSc in Sustainable Fisheries and Aquaculture to further deepen her expertise and contribute more meaningfully to the sector.



Muzamir Othman

Muzamir Othman is an experienced academic leader and educator, currently serving as the Senior Director of the Knowledge Management Centre and a Senior Lecturer at UNIRAZAK. With a career spanning over two decades, he possesses a deep expertise in Instructional Design, Technology in Education, and Visual Communication. Muzamir is currently pursuing a PhD in Education, adding to his academic background which includes an MA in Visual Communication and New Media and a BSc in Computer Science. He is a certified MQA Panel Assessor for ODL Programmes and holds numerous micro-credentials in cutting-edge fields such as AI for Education, Generative AI, and Sustainability. Driven by a belief that excellent education is the key to a better future, he combines strong professional ethics with a commitment to high-performance standards in teaching, research, and digital learning.



Mohd Hariez Pishal

Hariez Pishal graduated with a Bachelor of Education (TESL) from the University of Malaya. Despite his background in education, his longstanding interest in aquatic ecology has persisted well into adulthood. Shortly after graduating, he assisted in ethnographic research on the local ecological knowledge of Jakun fishers, under the supervision of Dr. Jarina Mohd Jani. Hariez is currently employed by Bank Negara Malaysia as an Associate Analyst.



Daniel Quilter

Daniel Quilter is a marine conservation practitioner and researcher with field experience in marine parks and coastal communities since 2005. He began his career as a research assistant with Sabah Parks in Semporna, working closely with local communities. In 2008, Daniel relocated to the Perhentian and Redang Islands, where he founded Fuze Ecoteer Outdoor Adventures and the Perhentian Turtle Project, the Perhentian Marine Research Station, and an eco-education programme focused on long-term community stewardship. His work has emphasised building local conservation capacity through structured citizen science pathways – engaging primary school students in coral health monitoring (CoralWatch) and microplastic surveys, then progressively training older students in Reef Check and Seagrass-Watch methodologies. Since 2023, Daniel has been a PhD candidate at Universiti Malaysia Terengganu (UMT), researching sea turtle mortality caused by vessel strikes. His research aims to inform practical mitigation strategies and contribute to evidence-based conservation policy in Malaysia.



Izarenah Md. Repin

Izarenah Md. Repin is a Fisheries Officer with the Fisheries Conservation and Protection Division (BKOPP), Department of Fisheries Malaysia in Putrajaya. She has over 15 years of experience in marine protected areas (MPAs) and marine park conservation, with a strong focus on long-term ecological monitoring, data analysis, and technical reporting to support policy and site-level management. Her expertise includes MPA planning and zoning, marine biodiversity conservation within fisheries governance, and habitat status and trend assessment. One of her recent projects involves documenting ecological information from Orang Asli communities, capturing local knowledge on fisheries resources and conservation to strengthen inclusive, evidence-based management.



Mohamad Anuar Roslan

Mohamad Anuar Roslan is a Fisheries Officer with 13 years of service at the Pahang State Fisheries Office, serving under the Conservation and Fisheries Protection Division. His responsibilities include fisheries enforcement in Malaysian waters, management of marine parks in Pahang, and the conservation of marine species. Passionate about marine conservation, he has a particular interest in sea turtle conservation and protection. Since 2022, he has been actively involved in a Local Ecological Knowledge (LEK) project with the Jakun Indigenous communities in the districts of Pekan and Rompin, focusing on integrating traditional ecological knowledge into conservation efforts.



Samsinar Md Sidin

Professor Datin Paduka Dr. Samsinar Md Sidin holds a holds an MBA and a PhD in Business Administration from University of Arkansas. She graduated with honours (Cum Laude) and was the recipient of the Wall Street Journal Award for Best Student in Economics. She also graduated in the top five and was nominated to represent University of Arkansas for the George Hay Brown Award for excellence in Marketing at graduate level in her MBA program. She is also a member of Yayasan Telekom Malaysia (TM) Board of Trustees. Professor Samsinar is currently the Vice Chancellor of Universiti Tun Abdul Razak (UNIRAZAK). Prior to this appointment, Professor Samsinar has been with Universiti Putra Malaysia (UPM) since 1984. Professor Samsinar has successfully completed more than 30 research projects and is currently leading several research projects. To-date, she has published and presented her research findings in more than a hundred major national, regional and international journals and conferences. She has co-authored 3 books and wrote 14 chapters in several books. She also has numerous patents in construct measurements, and won several Gold, Silver and Bronze Medals at Research Exhibitions.



Shelley Sebli

Shelley Sebli is a PhD candidate in Management at Universiti Tun Abdul Razak, researching environmental sustainability and social equity in Malaysia's small-scale fisheries. Under the "Blue Justice" framework, she examines how pollution and social factors impact coastal livelihoods. With an academic background in Corporate Master Business Admin (CMBA), Shelley leverages 14 years of energy industry experience to bridge policy and community development. She actively contributes to global initiatives like the V2V Partnership and TBTI, aiming to harmonize the Blue Economy with the rights and well-being of fishing communities to ensure equitable, sustainable outcomes.



Moe Shwe Sin

Dr. Moe Shwe Sin is a senior lecturer at the department of Economics, Faculty of Business, Economics and Social Development, Universiti Malaysia Terengganu. She received a PhD (Natural Resource Development Policy) in 2017 and an MSc (Land Resource Management) in 2011. Her research interests lie in Natural Resource Economics, Fisheries Economics, System Simulation, Econometric Modelling and Quantitative Analysis. She is a professional member of Asian Fisheries Society (AFS), EAAERE (the East Asian Association of Environment and Resource Economics), and System Dynamics Society, MIT, USA. She is also as a reviewer of journals such as American Journal of Resource Economics under Science Publishing Group, Current World Environment Journal (WOS), and Journal of Sustainability Science and Management (WOS). She is involved in research projects national and international level such as FRGS (fundamental research grant scheme) by MOHE, Ministry of higher education, MOSTI, Ministry of Science, Technology and Innovation, EEPSEA, Economy and Environment Partnership for Southeast Asia as a project leader and as well as co-researcher.



Haspinor Teh

Haspinor Teh is a Lecturer at the Faculty of Fisheries Science and Aquaculture, Universiti Malaysia Terengganu (UMT), specializing in Fisheries Economics and Aquaculture Economics. Teaching and academic responsibilities include Fisheries Economics, Aquaculture Economics, and Fisheries Entrepreneurship, as well as supervision of undergraduate research and evaluation of postgraduate students. Her research interests focus on fisheries socioeconomics, fishers' income and quality of life, and sustainable fisheries development within the blue economy framework. Research involvement includes projects related to marine resource management, coastal community development, and tuna fisheries. Academic engagement also includes participation in knowledge transfer programs, consultancy, and community-based initiatives related to fisheries and coastal communities. Academic work contributes to strengthening sustainable fisheries development and supporting evidence-based policy and socioeconomic resilience in fishing communities.



Siew King Ting

Siew King Ting is an economist at Universiti Teknologi MARA Sarawak. Holding a PhD in Economics from the University of New England, Australia, she specialises in productivity analysis, public sector economics, and labour market dynamics. Her scholarly work, published in reputable international and national journals, demonstrates rigorous empirical analysis. As a consultant, she provides expert analysis in human capital development and public policies to government agencies and private sector organisations. She supervises both undergraduate and postgraduate students while implementing innovative pedagogical approaches in economics. Her research portfolio effectively bridges theoretical frameworks with practical policy solutions and contributes significantly to Malaysia's economic discourse.



K. Kuperan Viswanathan

Professor Kuperan Viswanathan is a natural resource economist from Malaysia with more than 40 years of experience in resource economics, policy and development research, social science research capacity building, education and training. He was an Associate Professor at the Faculty of Economics and Management, Universiti Putra Malaysia from 1980 to 1998. He joined the WorldFish Center, a World Bank affiliated Center for International Agricultural Research (CGIAR) as a senior researcher in 1999 and led the Center's Dhaka and South Asia office from January 2004 – March 2005. He also led the Global Project on Fisheries Co-management which involved extensive partnership and research development with fisheries line agencies and research centers in Asia and Africa from 1999-2003. From 2010 to 2020 he was Professor of Economics at the Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia. He has published extensively on Fisheries Economics and Management covering developing country fisheries and fishing community development.



Tai Shzee Yew

Professor Dato' Dr. Tai Shzee Yew is a distinguished academic and internationally recognized scholar in fisheries economics, natural resource economics, and environmental policy. He currently serves as a Professor at Universiti Tunku Abdul Rahman (UTAR), Malaysia. Professor Tai has devoted more than four decades to higher education, research, academic leadership, and professional service. He also served as Deputy Vice Chancellor (Industry and Community Relations) at Universiti Putra Malaysia from 2007 to 2012. His research focuses on fisheries economics, natural resource and environmental economics, policy analysis, economic modelling, resource valuation, and sustainable resource management. His outstanding academic and public service achievements have been recognized through numerous prestigious awards and honors, including the Johan Setia Mahkota (JSM) and the Darjah Kebesaran Dato' Sharafuddin Idris Shah (DSIS). Through his extensive expertise and leadership, Professor Tai continues to make significant contributions to research, policy development, and capacity building in fisheries, environmental sustainability, and resource economics at both national and international levels.



Syahaneem Mohamad Zainalabidin

Syahaneem Mohamad Zainalabidin is a researcher specializing in agricultural policy and natural resource governance, with interdisciplinary expertise spanning forestry, agriculture, and fisheries. She holds a PhD in Agricultural Policy, with research focusing on how policy instruments, regulatory frameworks, and market-based mechanisms influence land use change, sustainability compliance, and smallholder livelihoods. Trained originally in forestry, she has substantial experience in forest eco-labelling systems. Her research also includes work on the assessment of economic losses arising from human–wildlife conflict. Her research portfolio also extends to the fisheries sector. She has contributed to studies assessing the cost structures and return on investment of key fishing gear along the west coast of Peninsular Malaysia, providing policy-relevant insights into the economic viability of capture fisheries. More recently, her work has engaged with nature-based aquaculture in Malaysia, focusing on the policy frameworks required to support environmentally sustainable and economically viable production systems.

This book provides a deep understanding of how small-scale fisheries contribute to the food, nutrition, and livelihoods of fishers in Malaysia. Through insights gained across its 17 chapters, the book enhances our understanding of the sector's complexity by highlighting the interplay among socio-economic vulnerability, environmental degradation, governance and community resilience. Contributions from academics, researchers, NGO representatives, and practitioners help readers navigate the importance and challenges of protecting the valuable fisheries resources. This is particularly crucial as coastal fishers face constant livelihood struggles exacerbated by overfishing, local environmental changes, and Illegal, Unreported, and Unregulated (IUU) fishing, which also contributes to marine pollution. To cope with these pressures, small-scale fisher households rely heavily on income diversification, the entrepreneurial efforts of housewives, and government subsidies. Because sustainable small-scale fisheries are deeply shaped by equitable access to resources for income and food security, we hope this book will be a valuable tool for stakeholders and practitioners working to support sustainable fisheries management. Ultimately, this work aims to raise public awareness and inform policymakers of the urgent need to protect these valuable fisheries and the livelihood of the communities in Malaysia.

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Small-Scale Fisheries are Too Big To Ignore