

## CURRENT RESEARCH THEME ON RECREATIONAL FISHING IN MALAYSIA: A SYSTEMATIC REVIEW

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**Abstract:** Enjoyed by millions of people of all ages and backgrounds around the world, recreational fishing is a popular activity that has the potential to provide food, social, environmental, and economic benefits. However, if it is poorly managed, it may negatively affect aquatic ecosystems. This study aims to review current research themes addressed by peer-reviewed papers on recreational fishing in Malaysia. A systematic search addressing recreational fishing in Malaysia was performed through web-based scientific search engines to provide adequate evidence. The downloaded data included authors' names, affiliates, titles, abstracts, keywords, publication year, article types, article languages, and other citation data. By conducting a systematic analysis, results show that all articles address socioeconomics, targeted species, catch-and-release procedures, post-release survival, and management. Despite growing concern in developed countries about the potential economic, social, and environmental benefits of recreational fishing, the benefits of recreational fishing in Malaysia have not been well explored. There is a lack of characterisation, highlighting, and addressing knowledge gaps.

Keywords: Recreational fishing, environment, management, conservation, Malaysia.

### Introduction

Recreational fishing or sport fishing is a popular pastime in which fishing is conducted for personal pleasure rather than commercial purposes. Recreational fishing differs from commercial fishing as recreational fishing is conducted only for personal use, while commercial fishing is conducted only for profit. Recreational fishing can take many forms, including freshwater fishing, saltwater fishing, fly fishing, and ice fishing. Recreational fishing typically uses a fishing rod, reel, line, and bait. It can be done from shore, a pier, a boat, or other types of watercraft. Recreational fishing's contribution to fish consumption (Morales-Nin, 2015) is undeniable and it has use and non-use economic value, whether free or at cost (Toivonen *et al.*, 2004). As asserted

by the previous researcher, it has the potential to provide psychological (Brinson & Wallmo, 2017), physical, and social benefits (Griffiths, 2017) such as relaxing or getting away from the daily life routine. In some cases, recreational fishing can contribute to family and friend engagement and provide opportunities for conservation efforts and sustainable fishery management.

Despite the nature of recreational fishing, categorised as leisure, around the world, it is estimated that the number of anglers is between 220 and 727 million (Cooke & Cowx, 2004). Meanwhile, in Malaysia alone, there are estimated to be more than 2.2 million recreational anglers, of whom 50% are involved in recreational fishing in saltwater

(Department of Fisheries, 2022). To the service provider of recreational fishing, this number would be viewed as positive. However, to the aquatic ecosystem, it may create unintended challenges that lead to the over-exploitation of fish resources (Cooke *et al.*, 2021) and substantially contribute to the fishing mortality of fish, especially marine species (Radford *et al.*, 2018; Lewin *et al.*, 2019). As evidence, Lyach and Čech (2018) found that yield and catch are decreasing despite the rise of recreational fishing activities in Central Europe. Harasti *et al.* (2019) added that illegal recreational fishing had become one of the leading causes of the decline in fishery stocks. Meanwhile, in industrialised countries, Arlinghaus *et al.* (2002) suggest that recreational fishing is a new form of exploitation of fish resources.

Furthermore, recreational fishing may affect aquatic ecosystems by introducing alien invasive species due to living bait release or stocking for fishing competitions (Sharifudin & Sharip, 2020). This occurs when alien invasive species conquer the ecosystem and disrupt the food web of local or native species. In addition, the implementation of catch and release may also disturb the aquatic ecosystem. As asserted by previous studies, the percentage of post-release survival of fish highly depends on the hooking injuries (Hisam *et al.*, 2018), hooking location (Veiga *et al.*, 2011), hook size (Sullivan *et al.*, 2013; Lennox *et al.*, 2015), physical injuries, and handling time (Lukacovic, 2003), which normally will influence the level of fish stress. More adversely, most injured fish released will die within 24 hours (Muoneke & Childress, 1994). In other words, the greater the bleeding, the lower the likelihood of survival. However, Huhn and Arlinghaus (2011) asserted that water temperature might also influence hooking mortality.

As Malaysia is home to many rivers, lakes, and coastal areas, it offers a variety of fish species for recreational anglers. Malaysia holds many fishing tournaments and yearly competitions that attract local and international anglers. Due to Malaysia's continued efforts to

develop and promote recreation activities as a tourism product, efforts to promote sustainable and responsible fishing are needed. However, without recent data, it is challenging to determine the most common themes or topics explored in research on recreational fishing in Malaysia. Based on those above, this study analyses the main themes addressed by peer-reviewed papers on recreational fishing in Malaysia.

The rest of this systematic review is organised as follows: Section 2 provides the materials and methods utilised for systematic review, Section 3 presents the result, followed by Section 4 discussion, and lastly, Section 5 concludes the findings.

## Materials and Methods

### *Sources Identification*

As a procedure to fulfil the research requirements and to answer the research objectives in this study, a systematic search through web scientific search engines for peer-reviewed articles addressing recreational fishing in Malaysia was conducted on 20<sup>th</sup> March 2023. This study limited itself to the data obtained from the databases of Scopus and Web of Science-indexed journals up to March 2023. The Scopus database was used as it was among the most extensive scholarly works (E-Vahdati *et al.*, 2023) and widely used by many authors to generate databases for systematic reviews (Xiao *et al.*, 2021; Zumpano *et al.*, 2023), while Web of Science has a long history of use in reviews of research (Hallinger & Kovacevic, 2019). In addition, the Scopus database provides superior (Hallinger & Kovacevic, 2019) and comprehensive coverage of sources (E-Vahdati *et al.*, 2023).

The keywords in the singular and plural form used for searching were delimited to: "Recreational fisheries" OR "recreational fishing" OR "recreational angling" OR "sport fishing" OR "non-commercial fishing" OR "angling" OR "angler" OR "fishing tournament" OR "fishing competition" OR "fishing championship" AND "Malaysia" in English.

Only full-text and peer-reviewed articles were selected in which recreational fisheries directly addressed the issues of recreational fishing or indirectly addressed recreational fishing but referred to the matters linked to recreational fishing in Malaysia. In other words, the peer-reviewed articles were selected to consider the originality and integrity of the format and content (Zumpano *et al.*, 2023). Hallinger and Kovacevic (2019) assert that reliance on an extensive database of peer-reviewed articles would provide a more consistent result for systematic review. This systematic review is novel as it gives insight into research on recreational fishing in Malaysia, allowing for finding current research themes in the literature.

### Data Extraction and Analysis

For systematic review analysis, the data are downloaded from both databases (i.e., Scopus and Web of Science) in the form of a comma-separated-values (.csv) file and saved to Excel. The downloaded data included authors' names, affiliates, titles, abstracts, keywords, publication year, article type, article languages, and other citation data. The downloaded data is systematically analysed in Excel.

### Results

Figure 1 shows the Preferred Reporting Items for Systematic Reviews and Meta-Analysis

(PRISMA) flow chart for selecting articles. A total of 166 potential articles were identified through two electronic databases, Scopus ( $n = 119$ ) and Web of Science (WoS) ( $n = 47$ ). After excluding the duplicates, the title and abstract of 161 selected articles were assessed for suitability. After our systematic review, we eliminated non-English articles, chapters in books, conference and reviewed papers, and books, and 93 remaining articles were subsequently read. Next, after reading the remaining articles, 93 were eliminated due to their non-relevance to the research objective, leaving three relevant articles that satisfied the inclusion criteria. These selected articles were included in the final steps of the qualitative synthesis.

Despite the small number of articles selected for review, it is sufficient to fulfil the objective of this study, as the authors attempt to highlight the current research themes addressed by peer-reviewed papers on recreational fishing in Malaysia. As evidence, previous authors also used a small sample size in systematic reviews. In this case, despite the fact that the number of samples selected by Xioa (2021) is nine, to analyse the specific category, Xioa (2021) used  $n = 6$  (speed),  $n = 5$  (muscular strength),  $n = 4$  (power),  $n = 3$  (balance, body composition, and agility), and  $n = 1$  (flexibility and muscular endurance). A similar technique was also used by Xioa (2022), where to analyse specific categories, the author used  $n = 8$  (speed and agility),  $n = 7$  (power),  $n = 4$  (strength), and  $n = 1$  (flexibility).

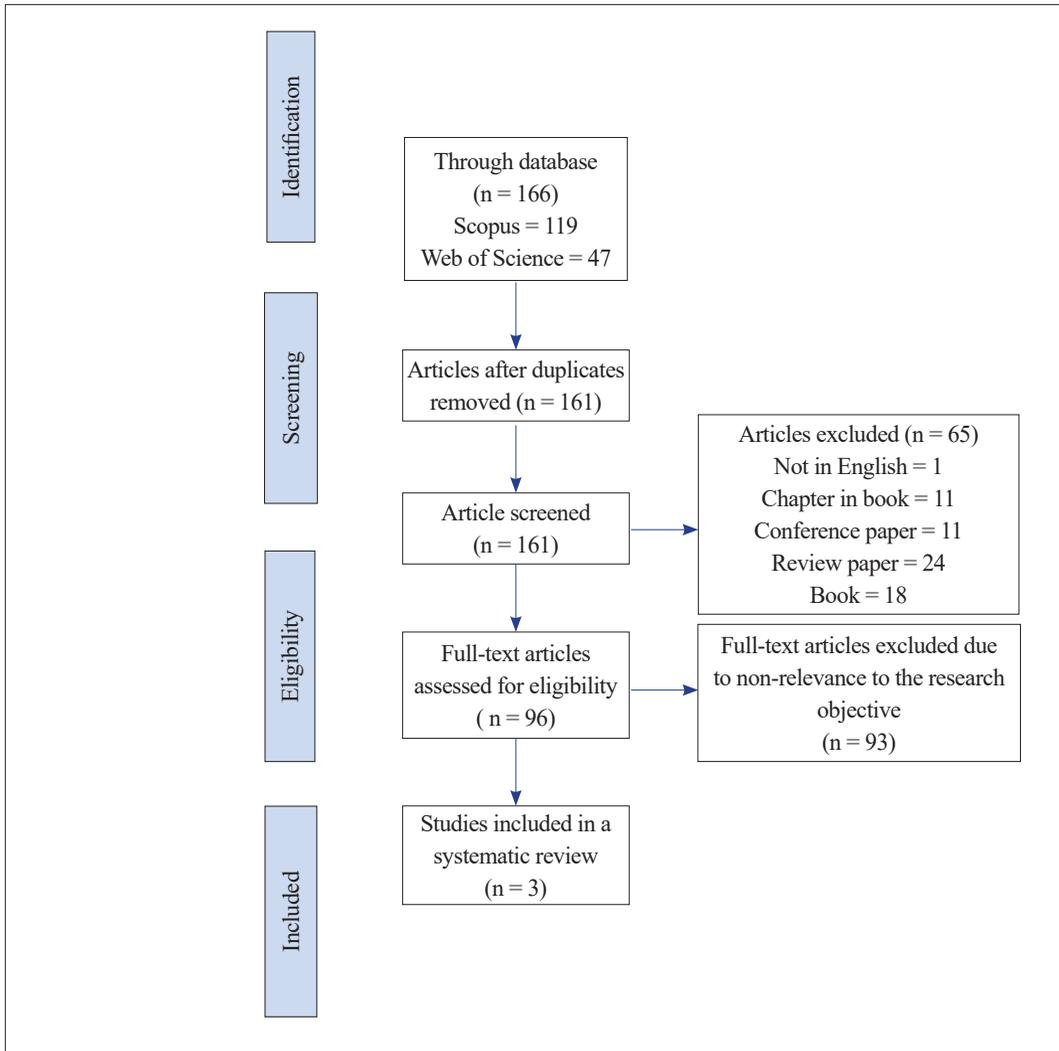


Figure 1: PRISMA flow chart of the study selection process

**Theme of Publications**

Table 1 shows the most common themes of recreational fishing in Malaysia. Out of 166 articles identified from Scopus and Web of Science (WoS) database, only three peer-reviewed articles fulfilled the selection criteria after removing duplicates, non-English language, chapters in books, conference papers, review papers, and books, and the full

text not addressing recreational fishing in the context of Malaysia. The article focused on socio-economics, targeted species, catch-and-release procedures, post-release survival, and management as shown in Table 1. All articles were published in the recent decade (2018 and 2020) and addressed the issues of recreational fishing in freshwater ecosystems.

Table 1: Characteristics of recreational fishing studies examined

Study	Socioeconomic	Targeted Species	Catch-and-release Practice	Post-release Survival	Management
Hisam <i>et al.</i> (2018)				√	
Shaefe and Kamaruddin (2020)	√	√	√		
Sharifudin and Sharip (2020)					√

## Discussion

Potentially contributing to fish consumption (Morales-Nin, 2015), psychological (Brinson & Wallmo, 2017), and physical and social benefits (Griffiths, 2017), recreational fishing has not received the same attention in Malaysia as compared to developing countries. Based on the themes of publications addressing recreational fishing in Malaysia (i.e., socio-economics, targeted species, catch-and-release procedures, post-release survival, and management), it was surprising that the number of published articles is minimal. Even though the article was searched using among the biggest (Scopus) and longest history of-use database (i.e., WoS), only three peer-reviewed articles were found published in both databases. As recreational fishing has been long developed by Taiwan, Japan, Singapore, Ireland, Thailand, the United States, Canada, Australia, and New Zealand (Department of Fisheries Malaysia, 2023), it worries that Malaysia is lagging in maximising the potential or identifying any issues related to recreational fishing, either in the context of economic, social, or environment.

It is important to note that recreational fishing may negatively impact the environment, particularly if not managed properly. For example, high and selective fishing can lead to declines in fish populations and undermine ecological and biodiversity resilience. Improper fishing practices such as loss of live bait and loss of lead can damage the habitats, environment, and ecosystems (Lewin *et al.*, 2019). Therefore, it is important to implement measures to ensure sustainable recreational fishing practices such as size and bag limits, seasonal closures, and

catch-and-release policies. Without proper guidelines or standards of procedure in handling recreational fishing (e.g., innovation in fishing gear and lessening), unintended challenges may be created that lead to the over-exploitation of fish resources (Cooke *et al.*, 2021). As asserted by previous studies, recreational fishing has substantially contributed to fishing mortality (Radford *et al.*, 2018; Lewin *et al.*, 2019). It is a new form of exploitation of fish resources (Arlinghaus *et al.*, 2002). On the other hand, Harasti *et al.* (2019) point out that illegal recreational fishing has become one of the leading causes of declines in fishery stock.

One potential approach to manage recreational fishing sustainably is possibly through the implementation of Marine Protected Areas (MPAs). MPAs are designated areas of the ocean where fishing and other activities are restricted or prohibited to protect marine ecosystems and species. Designating MPAs will reduce the fishing pressure and enhance the areas that host a greater abundance of fish (Alos & Arlinghaus, 2013), which enables a balance between conservation goals and recreational fishing opportunities. In fact, the benefits of MPA outweigh the negative impacts. As asserted by a previous study, the impact of MPA on the community in aggregate is minimal (Fox *et al.*, 2023); however, it potentially will shape social well-being and political power (Mascia *et al.*, 2010).

More interestingly, recreational fishing significantly contributes to the economics of local communities and coastal water (Hickley, 1998; Butler, 2020). In other words, anglers'

expenses benefited the local community and coastal water. The expenditure on recreational fishing may come from businesses such as bait and tackle shops, boat rental services, lodging, food, transportation, and other goods and services (Grizane *et al.*, 2020). Recreational fishing can attract tourists and anglers from all over the world (Alias, 2013) and is not limited to local anglers.

In addition, the economic benefits of recreational fishing may extend beyond direct spending on fishing-related goods and services. For example, recreational fishing can also lead to the development of related industries such as boat manufacturing and repair and support services like restaurants and hotels. Furthermore, recreational fishing can also have cultural and social importance in generating economic benefits. For many people, fishing is a traditional activity passed down through generations and is an essential part of their identity and community. Moreover, recreational fishing can provide opportunities for social interaction and strengthen relationships among family and friends.

From the above discussion, here are some additional suggestions for future research that could be included:

1. How does recreational fishing contribute to the local economy by creating jobs and generating revenue for businesses beyond fishing-related goods and services?
2. How does recreational fishing contribute to the cultural and social identity of communities, and what are the implications for policies and management practices related to recreational fishing?
3. How can sustainable recreational fishing practices be effectively implemented to minimise environmental negative impacts, including overfishing and damage to habitats and ecosystems?
4. What are the impacts of implementing MPAs that allow for recreational fishing on both conservation efforts and recreational fishing activities?

5. How can MPA areas be effectively managed to balance the needs of conservation and recreation?

It is worth noting that managing recreational fishing is often complex issue, as it involves balancing economic, social, and environmental factors. Therefore, it is important to engage in ongoing dialogue and collaboration between stakeholders, including anglers, businesses, conservation groups, and government agencies to ensure that recreational fishing is managed in a sustainable and equitable manner.

## Conclusions

This study makes a vital contribution to the literature. By applying a systematic review for the analysis, the themes of recreational fishing discussed in Malaysia could be categorised into five groups: Socio-economic, targeted species, catch-and-release, post-release survival, and management. To the researcher's knowledge, this is the first study that uses systematic review analysis to review the published documents addressing recreational fishing in Malaysia. Because recreational fishing provides significant benefits to the country, its development necessitates reviewing and investigating related social, economic, and environmental aspects.

The systematic review and analysis results have important implications in evaluating, characterising, highlighting, and addressing the knowledge gaps based on the recreational fishing domain. These analyses provided vital information to the author, scholar, decision maker, or institution in the field of research related to recreational fishing in Malaysia. Furthermore, identifying research hotspots and displaying them will allow decision-makers or institutional users access to sufficient data that can be used to recognise areas that need more attention. In essence, despite the limited publication of the article addressing recreational fishing in Malaysia, it needed to be expanded to report; however, it shed some light on the researchers' need to do more research in this area. This includes addressing issues of a social, economic, or environmental nature.

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## Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial, or financial conflicts and declare the absence of conflicting interests with the funders.

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