

MINI-REVIEW

Overview of Sustainable Fishing Practices in Selected Creeks from Raigad District: A Systematic Literature Review

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The authors assert that the manuscript was developed without any commercial or financial associations that could be interpreted as a potential conflict of interest.

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All listed authors have contributed significantly, directly, and intellectually to the work and have endorsed it for publication.

Abstract

This research paper offers a comprehensive overview of sustainable fishing practices in selected creeks of Raigad District, namely Karanja, Rewas, Revdanda, and Rajpuri Creek. Understanding and implementing sustainable fishing methods are imperative in light of escalating global concerns regarding declining fish stocks and environmental degradation. Drawing on a blend of literature reviews encompassing fisheries data and the cultural dynamics of the local fishing community, this study identifies pivotal factors shaping the sustainability of fishing practices in the region. These factors encompass community engagement, regulatory frameworks, technological advancements, and cultural considerations. Through an evaluation of fishing activities' socio-economic and ecological ramifications, the paper elucidates the challenges and opportunities for advancing sustainability in Raigad District's creek fisheries. Moreover, it delves into the significance of amalgamating traditional wisdom with contemporary approaches to bolster the resilience of indigenous fishing communities and safeguard marine ecosystems. This research offers invaluable insights for policymakers, researchers, and practitioners working towards sustainable fisheries management in coastal areas similar to the Raigad District.

KEYWORDS

Sustainable fishing practices; Raigad District; Community engagement; Regulatory frameworks; fishing community

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INTRODUCTION

Sustainable fishing practices are essential for protecting marine ecosystems, supporting livelihoods, ensuring food security, and achieving broader environmental objectives. [1]. Addressing the global challenges facing fisheries requires a concerted effort from governments, industry stakeholders, civil society, and local communities to promote responsible stewardship of our oceans and marine resources. The Raigad District, nestled along the western coast of Maharashtra, India, boasts a stunning array of natural features, including a network of creeks that meander through its picturesque landscape. Among these, four notable creeks—Karanja, Rewas, Revdanda, and Rajpuri Creek—stand out for their ecological significance, cultural heritage, and socio-economic importance to the local communities. This research explores the intricacies of sustainable fishing practices within selected creeks of the Raigad District. These creeks, characterised by their unique ecological profiles and socio-economic dynamics, offer a microcosm for examining the complex interplay between human activities and marine ecosystems. By focusing on these specific locales, the study aims to provide a nuanced understanding of the challenges and opportunities associated with fostering sustainability in coastal fisheries management. The importance of sustainable fishing practices extends beyond safeguarding marine ecosystems to sustaining livelihoods and achieving broader environmental goals. Collaborative efforts are essential among various stakeholders to address global fisheries challenges and promote responsible stewardship, as highlighted by research in Raigad District's creeks.

Methods and Material

Study area: We selected four different creek areas based on the availability of literature and their unique location throughout the Raigad district.

Karanja Creek: Located in the northern part of Raigad District, Karanja Creek (Latitude 18.8481, Longitude 72.9532) is renowned for its tranquil waters and lush mangrove forests. The creek serves as a vital habitat for various species of marine life, including fish, crustaceans, and migratory birds. Karanja Creek plays a crucial role in supporting the livelihoods of local fishing communities, who rely on its rich biodiversity for sustenance and economic activities.

Rewas Creek: Situated along the central coast of Raigad District, Rewas Creek (Latitude Longitude 18.8123, 72.9654) is characterised by its scenic beauty and diverse marine ecosystems. The creek is home to various fish species, including commercially important ones such as pomfret, mackerel, and prawns. Rewas Creek is a hub of fishing activity, with numerous fishing villages dotting its shores and dependent on its resources for their livelihoods.

Revdanda Creek: Located in the southern part of Raigad District, Revdanda Creek (Latitude 18.5403, Longitude 72.9331) is renowned for its historical significance and ecological diversity. The creek is flanked by ancient forts, historic temples, and quaint fishing villages, blending cultural heritage and natural beauty. Revdanda Creek supports a thriving fishing community engaged in traditional and artisanal fishing practices, contributing significantly to the local economy.

Rajpuri Creek: Nestled amidst the scenic splendour of Raigad's coastal landscape, Rajpuri Creek (Latitude 18.2632, Longitude 73.0114) is known for its pristine waters and serene surroundings. The creek is characterised by its rocky shores, sandy beaches, and crystal-clear waters, making it a popular destination for tourists and nature enthusiasts. Rajpuri Creek sustains a vibrant fishing community that relies on its abundant marine resources for livelihoods and sustenance while also attracting visitors with its natural beauty and recreational opportunities.

Results and Discussion

Based on the Systematic literature review, the Karanja, Rewas, Revdanda, and Rajpuri Creeks in Raigad District are important for ecological and socio-economic purposes.

Karanja Creek:

Ecological Importance: Karanja Creek serves as a crucial habitat for various marine species, including commercially important fish [2], crustaceans [23], marine mammals [25] and molluscs [6]. The presence of mangrove forests along its shores provides nesting and breeding grounds for several bird [4] species and acts as a natural buffer against coastal erosion and storm surges.

Socio-economic Importance: The creek supports a thriving fishing community [24] whose livelihoods depend on its abundant marine resources. Fishing activities [25] in Karanja Creek contribute to local food security, employment generation, and economic prosperity.

Rewas Creek: **Ecological Importance:** Rewas Creek is renowned for its diverse marine ecosystems, including mangrove forests [7], tidal flats [26], and estuarine habitats. These habitats support various flora and fauna [27, 28], including migratory birds, crabs, and fish species. The creek plays a vital role in maintaining coastal biodiversity and ecological balance. **Socio-economic Importance:** Rewas Creek sustains a vibrant fishing [29] industry, providing livelihoods to local communities engaged in fishing [8] and related activities. The creek also attracts tourists and recreational enthusiasts, contributing to the local economy through ecotourism and hospitality services.

Revdanda Creek: Ecological Importance: Revdanda Creek is characterized by its rich biodiversity [30] and unique ecological features. The creek supports mangrove ecosystems [31,32], and coral reefs [33], which are essential for marine biodiversity and ecosystem health. It provides critical habitats for various marine species [30] and plays a key role in nutrient cycling and coastal ecosystem functioning.

Socio-economic Importance: Fishing [34] is a primary economic activity in Revdanda Creek, providing livelihoods to a large number of local fishermen and their families. Additionally, the creek's scenic beauty and historical [35] attractions attract tourists, supporting local businesses and enhancing the area's socio-economic development.

Rajpuri Creek:

Ecological Importance: Rajpuri Creek boasts pristine natural beauty and diverse marine habitats, including rocky shores [30] and sandy beaches [36]. The creek supports a wide range of marine life [37], including fish [12] and shellfish [38]. It serves as an important breeding ground and feeding area for several species and contributes to overall coastal ecosystem resilience.

Socio-economic Importance: Fishing [12] and tourism [39] are significant economic drivers in Rajpuri Creek. Local fishermen rely on the creek's resources for their livelihoods, while tourists are drawn to its scenic landscapes, water sports opportunities, and cultural attractions. The creek plays a crucial role in supporting local livelihoods and promoting sustainable tourism development in the region.

Current status of sustainable fishing practices in creeks:

A total of 35 major landing centres and 195 fishing villages are reported throughout the Raigad district [42]. According to Maharashtra fishery censuses in 2016, more than 91% of fishing families in this district employ traditional fishing methods. The Karanja Creek study reported 53 fish species. Post-monsoon seasons exhibited higher diversity than pre-monsoon and monsoon. Abundant fish larvae highlighted the creek's role as a vital nursery ground [2],[40]. This creek supports thousands of fishing families for their livelihood, mainly from Navapada (n=2339) and Karajapada (n=570) [42]. Limited information is available for fishing practices along Rewas Creek. Mainly, Rewas (n=212) and Bodani (n=210) villages engage in fishing practices in this area, covering less than a thousand fishing families in the region [42]. Most of them are traditional bottom trawlers near the creek area who sell their seafood to Mumbai. Revdanda Creek serves as a traditional hub for fishing and plays a crucial role as a nesting site for Olive ridley sea turtles. More than 200 fishing families rely on traditional sustainable fishing practices along Revdanda Creek, including Agrav (n=130), Revdanda (n=68), and Salav (n=13) villages [42]. Fishing in Rajpuri Creek primarily involves artisanal methods, specifically the use of fixed barrier nets known as 'Dharan Jal'. These nets are constructed with nylon or cotton netting, comprising 8 to 10 rectangular pieces, each measuring 10m x 2.5m with a mesh size of 8-10mm. The nets are deployed in shallow waters, approximately 1.5- 2.0m deep along the creek's shoreline, and are joined together to form a barrier, spanning an average length of 80 to 100m [11]. More than 700 fishing families sustain their livelihoods based on traditional fishing methods along this creek, including Ekdara (n=272), Murud (n=371), and Rajpuri (n=245) villages.

According to the literature survey, a significant number of bird species (n=128) were documented along this creek, followed by reported instances of bycatch and discard (n=101), marine fish species (n=86), molluscs (n=64), phytoplankton (n=56), crustaceans (n=30), and mangrove species (n=21) mentioned in Fig.1. Additionally, our findings revealed that Karanja Creek is the most extensively studied among the four creeks in the Raigad district, reporting not only high numbers of species but also a substantial species diversity (n=336), followed by Revdanda Creek (n=79) and Rajpuri Creek (n=63). Conversely, limited previous research has been conducted in the Rewas Creek area (n=8), indicating a significant gap in available data for this region.

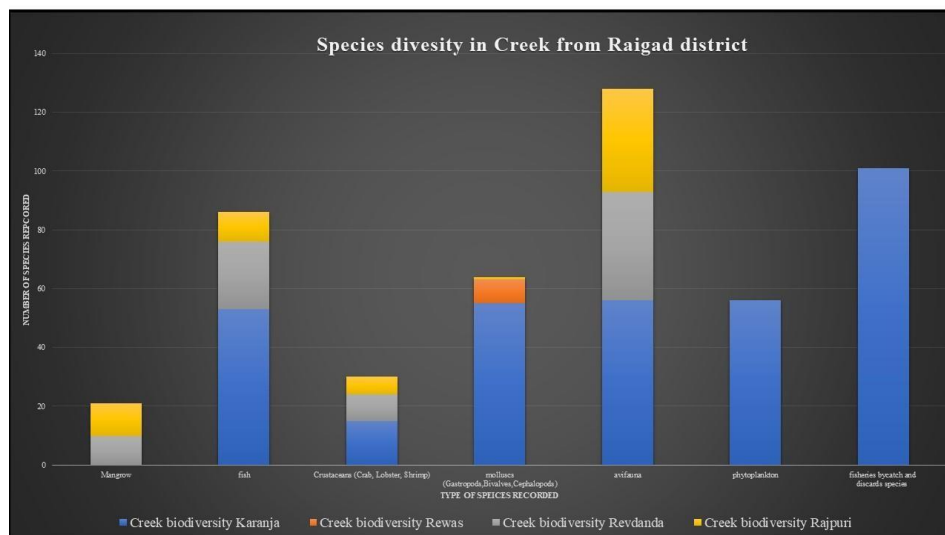


Figure 1 Species Diversity in Creek

Diversity of Fishing Gear: The data indicates a diverse range of fishing gear being used across the four creeks, including dolnet, gillnet, lift net, hand net, bottom trawl, barrier net, cast net, encircling gill net, and set bag net. This diversity suggests a variety of fishing techniques fishermen employ in these areas.

Consistency in Certain Gear Types: Certain gear types, such as dolnet and gillnet, are consistently present across all four creeks. This suggests their importance or effectiveness in these fishing environments, possibly due to their suitability for specific target species or fishing conditions.

Regional Variations: While some gear types are common across all creeks, there are variations in certain gear types between creeks. For example, Revdanda and Rajpuri creeks show a higher prevalence of barrier nets than Karanja and Rewas creeks. mentioned in Fig.2.

Implications for Fisheries Management: Understanding the distribution and prevalence of different fishing gear types can inform fisheries management efforts. It can help identify potential areas of gear conflict, assess the impact of fishing activities on marine ecosystems, and develop targeted management strategies to promote sustainable fishing practices and resource conservation. In conclusion, the data on the presence of fishing gear types in Karanja, Rewas, Revdanda, and Rajpuri creeks highlights the complexity of fishing activities in these coastal areas and underscores the importance of comprehensive and adaptive fisheries management approaches tailored to the specific needs and characteristics of each creek ecosystem.

Sustainable Fishing Practices and Ecological Implications: Insights from Traditional Practices in a Creek Ecosystem Based on the information available regarding the use of fishing gear and traditional practices in the creek, several key conclusions can be drawn:

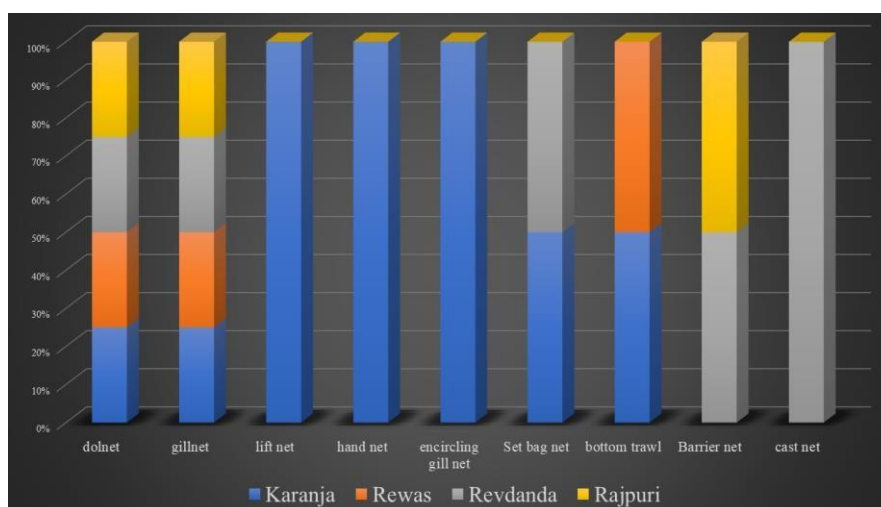


Figure 2 Comparison of Fishing Gear Usage Across Karanja, Rewas, Revdanda, and Rajpuri Creeks

Diverse Target Species: The fishing activities in the creek target a diverse range of species, including *Acetes* sp, *Acetes indicus*, *Arius maculatus*, *Charybdis callianassa*, *Chrysaora Caliparea*, *Coilia dussumieri*, *Harpadon*

nehereus, *Lepturacanthus savala*, *Miyakella nepa*, *Mystus gulio*, and *Parapenaeopsis sculptilis*. This suggests a varied ecosystem supporting multiple commercially important and ecologically significant species.

Adaptive Traditional Practices: Traditional fishing practices in the area demonstrate adaptability to local environmental conditions, such as tidal amplitude, water depth, and seasonal changes. The selection of fishing gear is tailored to these factors, with some gears being seasonal, such as encircling gill nets during the pre-monsoon period. Dolnets, on the other hand, are utilized year-round. This adaptive approach indicates a nuanced understanding of the local marine environment and the importance of sustainable fishing practices.

Potential Impact on Ichthyofaunal Diversity: The significant fishing activities in the creek, coupled with the use of traditional crafts and gears, may have implications for local ichthyofaunal diversity. While these practices provide livelihoods for fishing communities, there is a need for careful management to ensure the conservation of fish stocks and the broader marine ecosystem. In conclusion, the fishing practices in the creek reflect a balance between traditional knowledge and adaptation to changing environmental conditions. However, there is a need for continued monitoring and management to mitigate potential impacts on ichthyofaunal diversity and ensure the long-term sustainability of fishing activities in the area.

CONCLUSION

The creeks in Raigad District serve as crucial habitats for diverse marine species, supporting ecological and socio-economic functions. Fishing communities in Karanja, Rewas, Revdanda, and Rajpuri creeks rely on diverse fishing practices tailored to local environmental conditions, showcasing adaptability and traditional knowledge. Despite variations in fishing gear prevalence across the creeks, consistent use of certain gear types underscores their importance in these ecosystems. Comprehensive fisheries management strategies are essential to balance sustainable fishing practices with conservation efforts, ensuring the long-term viability of marine resources in these coastal areas.

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