Int J Biol Med Res. 2024; 15(4): 7884-7888

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

Diversity of Ichthyofauna from Ratnagiri, Ganeshgule, Maharashtra's west coast.

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A R T I C L E I N F O

Keywords:
Arabian coast,
fish species,
groupers,
mullet.

A B S T R A C T

Ratnagiri located in the Maharashtra state of India is a well-known coastal region with a 167-kilometer-long coastline along the Arabian Sea. It has many important harbourswhich support a booming fishing industry. Ratnagiri is renowned for various popular fish species such as mackerel, shark, skate, ray, tuna, and pomfret, as well as low-cost species that serve as staple foods. While most people prefer popular fish, lesser-known species are often ignored or consumed primarily by fishermen and poorer communities.This study aimed to explore the rich fish biodiversity of these commercially minor species and evaluate their potential as protein-rich food sources. The research was conducted between September 2022 and February 2023 in the Ganeshgule area, where 19 fish species from 8 orders and 13 families were identified, including varieties such as mullet, perch, walleye, and mangrove snapper. Fish samples were collected with the assistance of local fishermen using traditional nets like the "Pata" and "Vavari" nets, and species were identified using taxonomic keys alongside photographic documentation. Both day and night observations were conducted to account for variations in fish behaviour.Results indicate that these lesser-known species offer significant commercial potential due to their abundance and high protein content, which could provide an affordable food source for local communities. These findings contribute to understanding fish diversity in Ratnagiri and highlight the opportunity to promote these species as a sustainable food option.

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Introduction

With almost a billion people residing there, India poses significant challenges to food security. After understanding the importance of fish to many aspects of society, including food security, recreation, and even biological control, India started the Blue Revolution to address these issues and support sustainable fishing techniques [1]. India contributes significantly to securing global food security as the world's third-largest fish producer, making up 8% of total production [2]. Fishing has a significant economic influence on India; in 2021 and 2022, the country produced 16.24 million metric tonnes of fish [2].

Ratnagiri is a coastal district known for its rich marine biodiversity, located on Maharashtra's western coast in India. Many marine fish species, including Pomfret, Bombay duck, and Seer fish, can be found in Ratnagiri. Because of the constantly changing maritime environment, it's a perfect spot for studying fish biodiversity. The variety of fish populations is a key indicator of the stability and health of marine environments.

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Effective management of fisheries and conservation efforts requires a complete understanding of the distribution and abundance of fish species. Lesser-known fish species are often under-studied despite being more nutritious and flavourful than their popular counterparts. These species are typically overlooked by consumers and researchers, leading to a gap in knowledge about their potential benefits. Their high protein content and unique taste profiles make them valuable food sources, especially for communities seeking affordable and nutritious options. Highlighting and studying these fish can contribute to diversifying diets and improving food security.

Ganeshgule offers a unique opportunity to discover the diversity of marine ichthyofauna, which is often overlooked. Fishermen in Ganeshgule mainly use conventional fishing methods, with nets like the "Vavari net" or "Pata net," yielding a variety of fish species, many of which are lesser-known. People who live in coastal areas and have lower incomes typically have a preference for lesser-known fish species because they value their distinct flavour and nutritional qualities.

The importance of these lesser-known species may not be fully understood by those who live in cities, but it is notable. On the other hand, people frequently favour popular fish species, sometimes overlooking the range of culinary and nutritional experiences that lesser-known marine species may provide.

This study aims to catalogue and assess the variety of fish species in the coastal waters of Ganeshgule, Ratnagiri, and highlight the flavour and nutritional value of lesser-known fish species. Our goal is to enhance understanding and appreciation of the diverse range of marine life beyond the widely popular species. Additionally, this research lays the groundwork for promoting sustainable fishing methods and strengthening connections between the local community and its marine environment.

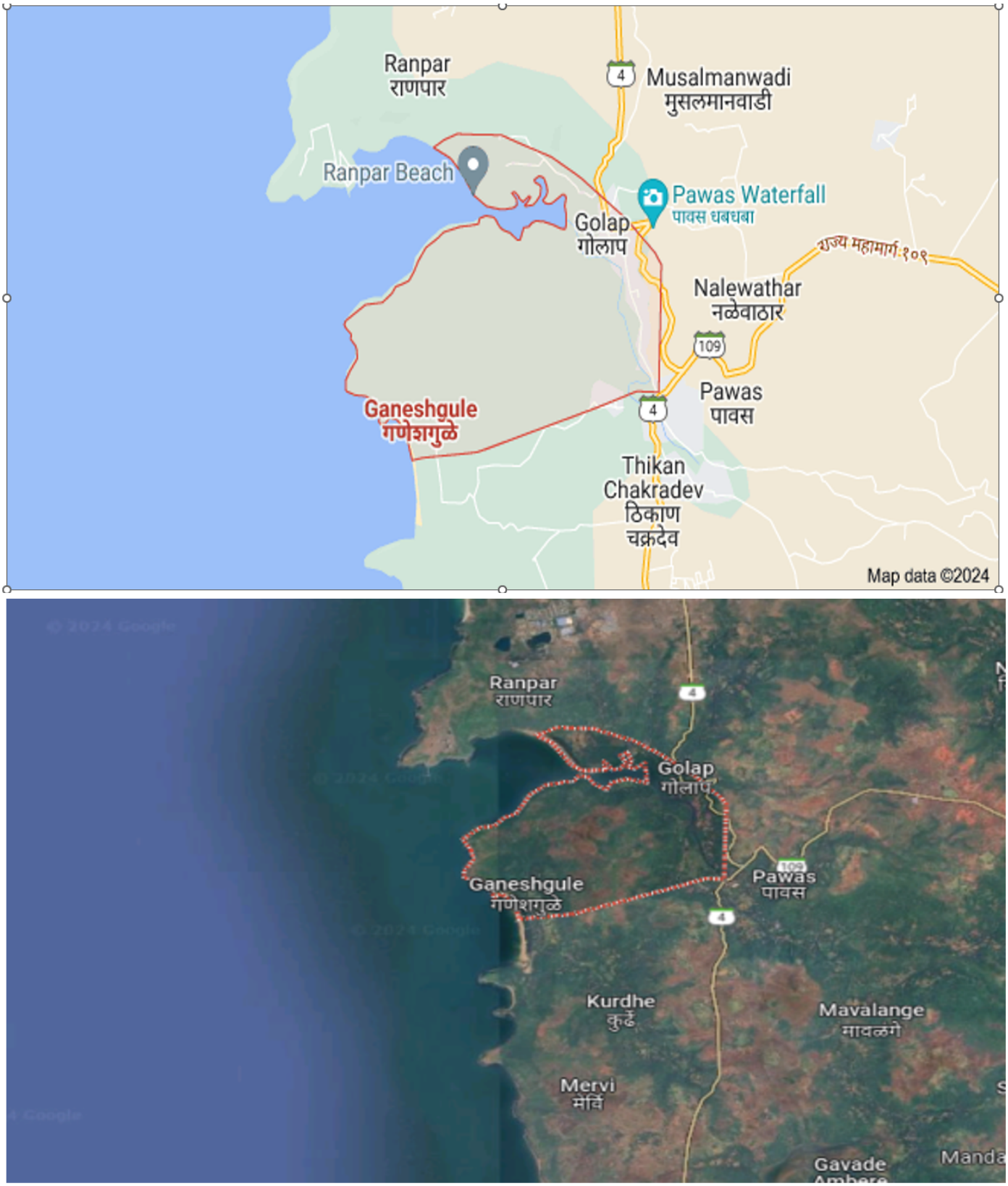
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Materials and Methods:

Study Area

Ganeshgule (16.8711° N, 73.2946° E), located 22 km from Ratnagiri and 4 km from Purngad, was chosen as the primary study area to investigate ichthyofaunal diversity and relative species abundance in the marine fisheries of this region of Maharashtra state. This coastal village is characterized by a combination of sandy and rocky shores, influenced by the surrounding mountains and the Arabian Sea. (Fig.1).

Fig. 1 Map of Ganeshgule showing the fish collection site



In Ganeshgule, mostly traditional fishing methods, utilizing nets such as the "Vavari," "Budi," "Dol," and "Rampan net," were employed to capture fish samples. A thorough observation of fishing operations was conducted to gain insights into local fishing practices and the relationship between the coastal environment and fish populations. The captured fish were carefully identified and documented, with a particular focus on lesser-known species.

Sampling Period

The study was carried out over six months to document the seasonal

fluctuations in fish biodiversity, from September 2022 to February 2023. During this time, visits were made one day per month to ensure a thorough evaluation of the ichthyofaunal diversity in the research area.

Method of Sampling

With the help of local fishermen, fish samples were gathered from the west coastline area in the Ganeshgule area of the Ratnagiri District, Maharashtra, India. Fishing operations using locally used nets, like the "Pata net" and "Vavri net," were closely monitored. To ensure precise identification and documentation, digital camera photos of the captured fish were taken shortly after capture. This strategy made it possible to conduct a thorough evaluation of the ichthyofaunal diversity in the region.

Data Collection

The catch from each fishing operation was meticulously documented, noting species diversity and abundance. To take into consideration the fluctuations in fish behaviour during the day, observations were done both during the day and at night. This method guaranteed a thorough comprehension of the region's ichthyofaunal variety.

Fish Identification

Ichthyological fauna were identified using a combination of visual observations and, when necessary, the expertise of local fishermen experienced in species recognition. Fish samples were identified up to the species level following established taxonomic keys and references [3, 4, 5]. Photographs of each species were taken immediately after capture with a digital camera to aid in accurate identification and documentation.

Data Analysis

Quantitative data on species composition, abundance, and size were analyzed using statistical software. Seasonal and depth-dependent variations in fish catch were assessed to identify patterns and trends.

Community Engagement

Local communities were actively involved in the research process, providing insights into traditional fishing practices and sharing knowledge.

Results

Species Diversity and Abundance

In our present study, observations revealed fluctuating trends in the catch rate. During the research, we identified 19 distinct fish species, spanning 8 orders and 13 families. The recorded species diversity and relative abundance are detailed in Table 1.

Table 1. Distribution and abundance of species in Family, Order, Scientific Name and Common Name of fish

Family	Scientific name	Common name	Marathi name	Relative Abundance (%)
Order- Carcharhiniformes				
Carcharhinidae	Carcharhinus sorrah	Spot tailed shark	Vatu	2%
Scyliorhinidae	Haploblepharus fuscus	Brown shy shark	Mushi	3%
Order- Carangiformes				
Caranginidae	Scomberoides lysan	Double-spotted queen fish	Khalvat	5%
	Atropus atropos	Cleftbelly trevally	Kaap	4%
	Caranx sexfasciatus	Bigeye trevally Fish	Kokeri	5%
Order- Perciformes				
Latidae	Lates calcarifer	Sea bass	Kanay	10%
Lutajanidae	Lutjanus argentimaculatus	Mangrove red snapper	Tamboshi	10%
	Lutjanus bengalensis	Bengal snapper	Tamboshi	5%
Serranidae	Epinephelus coioides	Orange spotted grouper	Gobra	5%
	Epinephelus malabaricus			15%
	Epinephelus kupangensis	Five bar groupers	Gobra	3%
Polynemidae	Eleutheronema tetradac-tylum	Forefinger threadfin	Rawas	5%
Siganidae	Siganus vermiculatus	Vermiculated spinefoot	Tauj	3%
Order- Scombriformes				
Scombridae	Rastrelliger kanagurta	Indian mackerel	Bangada	6%
	Rastrellige rbrachysoma	Short mackerel	Bangada	4%
Order- Perifromes				
Carangidae	Trachurus trachurus	Horse mackerel	Hado bangada	5%
Mugiliformes				
Mugilidae	Mugil cephalus	Flathead grey mullet	Boyar	20%
Istiophoriformes				
Sphyraenidae	Sphyraena sphyraena	European,barracuda	Dandoshi	4%
Lampriformes				
Trachipteridae	Desmodema polystictum	Ribbon fish	Bala	2%

This table shows that most species are accessible all year round, except the monsoon season (June to August) when fishing is prohibited by the Maharashtra government to safeguard the populations of spawning fish. Every species has a relative abundance of zero during this time. Lutjanus argentimaculatus, Lates calcarifer, Epinephelus malabaricus, and Mugil cephalus were the species most frequently observed.

Distribution of Size

There was a noticeable variation in the fish species' size distribution; Rastrelliger brachysoma, for example, showed a length range of 15 to 35 cm with a mean size of 25.0 cm. The largest species found was Carcharhinus sorrah, which had a mean size of 100.0 cm and a range of 50 to 150 cm.

Table 2: Size Distribution and Mean Size of Fish Species observed in Ganeshgule

Scientific Name	Minimum Size (cm)	Maximum Size (cm)	Mean Size (cm)
Carcharhinus sorroh	50	150	100.0
Haploblepharus fuscus	30	80	55.0
Scomberoides lysan	20	60	40.0
Atropus atropos	15	50	32.5
Caranx sexfasciatus	25	75	50.0
Lates calcarifer	25	55	40.0
Lutjanus argentimaculatus	20	45	32.5
Lutjanus bengalensis	20	45	32.5
Epinephelus coioides	20	60	40.0
Epinephelus malabaricus	20	60	40.0
Epinephelus kupangensis	20	60	40.0
Eleutheronema tetradactylum	15	50	32.5
Siganus vermiculatus	15	45	30.0
Rastrelliger kanagurta	20	40	30.0
Rastrelliger brachysoma	15	35	25.0
Trachurus trachurus	20	45	32.5
Mugil cephalus	15	40	27.5
Sphyraena sphyraena	30	100	65.0
Desmodema polystictum	40	120	80.0

Discussion

The results of this investigation offer a thorough summary of Ganeshgule's ichthyofaunal variety, emphasising the existence of both well-known and lesser-known species. A broad range of species should be taken into account in fisheries management strategies due to the notable variance in species abundance and size distribution.

Similar patterns of high species richness were noted by researchers in their research of the fish diversity in Kerala's coastal waters, especially in families like Carangidae and Scombridae, which are similarly well-represented in our results[6]. In line with their findings, several species, including Trachurus trachurus and Rastrelliger kanagurta, were found in our study, suggesting a wider regional trend in the make-up of coastal fish groups.

Our study's results align with previous research conducted in similar coastal regions. For instance, high species diversity in coastal fisheries of India was reported, with a notable dominance of species such as mullets and groupers, which were also prevalent in our study[7]. Similarly,the ecological significance of a wide range of species, from economically important fish to lesser-known species was highlighted, documenting remarkable fish diversity in the tropical estuaries of India[8]. The finding of lesser-known species highlights the need for more investigation into their possible benefits to local economic growth and food security.

It is ecologically significant that certain species, such as Epinephelus malabaricus (grouper)and Mugil cephalus(mullets)predominate. Mostly groupers are the top predators that support the equilibrium of marine food webs, mullets are essential to the nutrient cycling which occurs within coastal ecosystems. Because of the great number of these species, the region's fisheries are likely to remain sustainable because of a robust and well-balanced ecosystem.

Smaller-known species found in this study, like the Vermiculated spinefoot (Siganusvermiculatus) and the Brown shy shark (Haploblepharus fuscus), are also crucial to the environment. According to some researchers, the Vermiculated spinefoot helps to sustain the health of coral reefs by feeding on algae, whereas the Brown shy shark helps regulate the populations of benthic invertebrates [9]. Since these species are important to the general resilience and productivity of marine ecosystems, their conservation must be prioritised.

Implications for Fisheries Management

According to the findings, sustainable fisheries management techniques that take into account the entire range of fish biodiversity are essential. Ecologically significant but lesser-known species should also be protected by policy, in addition to those that are vital for commerce.

Need for Further Research

The identification of lesser-known species in our study highlights the need for further research to explore their potential contributions to local food security and economic development. Research on the nutritional worth and commercial potential of these species may be able to mitigate fishing pressure on overfished species while offering local communities' alternate means of subsistence [10].

The impact of environmental factors including habitat degradation and climate change on fish biodiversity in the region should be the subject of future research. Long-term monitoring programmes, such as the Great Barrier Reef monitoring programme started by Sweatman et al. may provide useful data regarding the adaptability of fish populations and direct the creation of adaptive management strategies [11].

Conclusion

By identifying and evaluating the variety and number of fish species in the coastal waters of Ganeshgule, Ratnagiri, this study has contributed significantly to our understanding of the ichthyofaunal richness of the region. Based on the results, plans for fisheries management and conservation need to consider both more and less well-known species. The long-term health and productivity of marine ecosystems in the region will depend critically on encouraging sustainable practices and additional research on understudied species. In addition to providing insightful data on fish biodiversity, this study promotes the inclusion of community involvement and local knowledge in the development of successful conservation plans.

Acknowledgements

This research was carried out with the support of the Department of Biotechnology (DBT), Government of India, under the DBT Star College Scheme. We sincerely thank DBT for funding and facilitating this study on fish biodiversity in the Ratnagiri district. We also extend our gratitude to the local fishermen of Ganeshgule for their valuable assistance in sample collection and species identification.

Conflicts of Interest

Regarding this work's publication, the authors declare that they have no conflicts of interest.

References

[1] Lad, S., & Patil, P. Blue Revolution in India. Research Journal of Animal Husbandry and Dairy Science, 2013; 4(1), 1-4.

[2] Food and Agriculture Organization (FAO). The State of World Fisheries and Aquaculture 2023; FAO.

[3] Talwar, P.K. and Kacker, R.K., Zoological Survey of India. Handbook: Commercial sea fishes of India. Publisher: Director, Zoological Survey of India, Calcutta - 700 012, 1984; 596-598.

[4] Smith, M. M., & Heemstra, P. C., Smith's Sea Fishes. Springer-Verlag, 1986.

[5] Froese, R., & Pauly, D., Fish Base. World Wide Web electronic publication. 2010; www.fishbase.org.

[6] Ranjith, L., Kumar, R., & John, S., Fish diversity and distribution in the coastal waters of Kerala, India. Journal of Marine Biology, 2018; 6(2), 101-111.

[7] Bhathal, B., & Pauly, D., 'Fishing down marine food webs and spatial expansion of coastal fisheries in India, 1950-2000. Fisheries Research, 2008; 91(1), 26-34.

[8] Shamsi, S., Sreeram, M., & Anoop, K. R., Fish diversity and distribution in the tropical estuaries of India. Marine Biology Research, 2011; 7(2), 166-177.

[9] Smith, M.M. and P.C. Heemstra,Balistidae. 1986; p. 876-882. In M.M. Smith and P.C. Heemstra (eds.) Smiths' sea fishes. Springer-Verlag, Berlin.

[10] Sadovy, Y., & Cheung, W. L., Near extinction of a highly fecund fish: The one that nearly got away. Fish and Fisheries, 2003; 4(1), 86-99.

[11] Sweatman, H., Delean, S., & Syms, C., Assessing loss of coral cover on Australia's Great Barrier Reef over two decades, with implications for longer-term trends. Coral Reefs, 2011; 30(2), 521-531.

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