

No.1, January-June 2025

KALPAMATSYA

A biannual Shark Science
Digest from India

THE SHARK

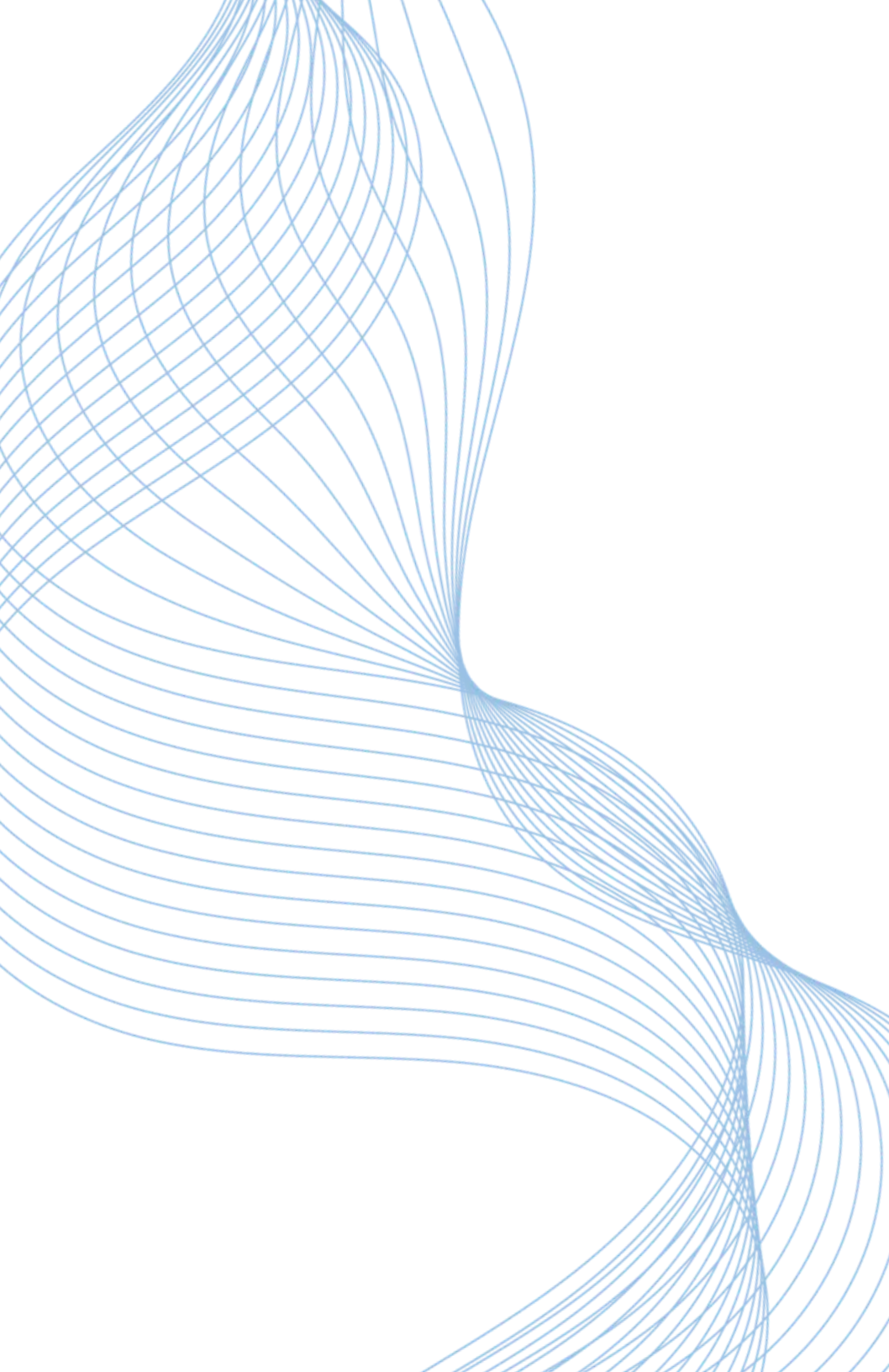


ICAR-Central Marine Fisheries Research Institute

(Department of Agricultural Research and Education, Government of India)

PB. No. 1603, Ernakulam North PO., Kochi - 682 018, Kerala, India





No.1, January-June 2025

KALPAMATSYA

A biannual Shark Science
Digest from India

THE SHARK



ICAR-Central Marine Fisheries Research Institute

(Department of Agricultural Research and Education, Government of India)

PB. No. 1603, Ernakulam North PO., Kochi - 682 018, Kerala, India



KALPAMATSYA

THE SHARK

Patron

Dr Grinson George
Director, ICAR-Central Marine Fisheries Research Institute

Editorial Board

Dr Shoba Joe Kizhakudan
Dr Sujitha Thomas
Dr Ganga U
Dr Purushottama G B
Dr Swatipriyanka Sen Dash
Dr Akhilesh K V

Editor-in-Chief

Dr Muktha Menon

Editors

Dr Remya L
Dr Livi Wilson
Dr Shikha Rahangdale

Sub-editors

Dr Najmudeen T M	Dr Surya S
Dr Mahesh V	Dr Abdul Azeez P
Dr Subal Kumar Roul	Mr Ajay Nakhawa
Dr Rajesh K M	Dr Veera Venthana K.R
Dr Anulekshmi C	Mrs .Vidhya V

Published by

Dr Grinson George
Director, ICAR-Central Marine Fisheries Research Institute

Cover Photo

Alvin Anto

Layout and Design

P. R. Abhilash & Sidharth Sen

From the director's desk

As we embark on an exciting journey with the launch of Kalpamatsya - The Shark, the first biannual publication of its kind from India, I am filled with immense pride and hope. This digest is more than just a collection of articles; it is a platform to showcase and promote cutting-edge research and insights on sharks, rays, and their fragile ecosystems. It is a reflection of our collective commitment to the conservation and sustainable utilization of these magnificent yet vulnerable marine fauna.

Sharks have always held a significant place in marine ecosystems, acting as apex predators that maintain ecological balance. However, their existence is increasingly threatened by overfishing, habitat destruction, and climate change. India, with its rich coastal and marine biodiversity, bears a unique responsibility in ensuring their survival. Through Kalpamatsya, we aim to bring together knowledge, perspectives, and action from researchers, policymakers, and conservationists to address these challenges.

This digest is envisioned as a beacon of collaboration and knowledge-sharing, bridging the gap between scientific research and public awareness. It is our sincere hope that Kalpamatsya will inspire meaningful dialogue and actions toward the sustainable management and conservation of shark and ray populations.

I extend my heartfelt thanks to the dedicated team behind this initiative and the contributors whose efforts have made this dream a reality. As we turn the pages of this inaugural issue, let us celebrate the start of a new chapter in India's marine conservation story and reaffirm our commitment to safeguarding these delicate resources.

Wishing Kalpamatsya - The Shark
immense success and a lasting impact.

Dr Grinson George

Director

ICAR - Central Marine

Fisheries Research Institute



Editor's voice

Dear Readers,

It is with great enthusiasm that we welcome you to the inaugural edition of the **Kalpamatsya: The Shark** - a dedicated platform from India for sharing the latest research, conservation efforts, and stakeholder engagement initiatives concerning sharks, rays, and guitarfishes in Indian waters.

Often perceived solely as formidable hunters of the deep, sharks are, in fact, vital apex predators that help maintain the delicate balance of marine ecosystems. Whether navigating coral reefs, open waters, or the depths of the ocean, they act as key indicators of marine health and ecosystem resilience. India, with its vast coastline and diverse marine ecosystems, is home to an extraordinary variety of elasmobranch species that play a critical role in maintaining the health and stability of our oceans. However, they face increasing threats from overfishing, habitat degradation, climate change, and bycatch.

As an emerging voice in the field of marine conservation, **Kalpamatsya: The Shark** seeks to provide a comprehensive perspective on the challenges and opportunities in shark conservation, presenting insights into species ecology, fisheries management, and community-driven sustainability efforts. We highlight efforts promoting responsible fishing, marine spatial mapping, and awareness campaigns to safeguard these keystone species.

This first edition brings to light the advancements in shark research at ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI) and its impact on improving India's shark conservation and management initiatives. We aim to bridge the gap between science, policy, and community participation and hope that **Kalpamatsya: The Shark** will help champion efforts in India's shark conservation movement toward a future where our oceans thrive in harmony with the species that call them home.

Dr Swatipriyanka Sen



The Team -2025



Shoba Joe
Kizhakudan



Sujitha
Thomas



Ganga U



Muktha
Menon



Purushottama
G B



Swatipriyanka
Sen



Akhilesh K V



Remya L



Livi Wilson



Shikha
Rahangdale



Najmudeen
T M



Mahesh V



Subal Kumar
Roul



Rajesh K M



Anulekshmi C



Surya S



Abdul
Azeez P



Ajay
Nakhawa



Veera
Venthana K.R



Vidhya V



Contents

Research snapshots	10
Success stories	21
Spotlight	23
Viewpoint	25
Conservation corner	33
Shark tales	39
Share your stories	43
Shark gallery	49
Shark quest	53
Shark shop	55



Research snapshots

The beginning

ICAR-CMFRI has a seven decade long history of elasmobranch research in India dating back to the late 1940s. The first ever project solely dedicated to elasmobranch research was started at CMFRI in 1972. Later on, elasmobranch research became subsumed in state-based projects. However, elasmobranch research at the Institute gained momentum in 2012 when a dedicated in-house research project titled **“Assessment of Elasmobranch resources in the Indian Seas (2012-17)”** was initiated. The research and development activities further intensified with the project's second phase titled **“Developing management plans for sustainable exploitation and conservation of elasmobranchs in India (2017-24)”**.

Key Achievements (2012–2024)



54 Peer-reviewed articles



37 Technical articles



7 Policy documents
(including 5 NDFs)



1 Field guide



18 Electronic resources



3 Teaching resources



11 Pamphlets



6 Posters



51 GenBank submissions

The momentum is expected to be carried forward in future with an ongoing project at the Institute **“Decoding the interplay of fisheries-dependent and fisheries-independent factors on elasmobranchs of India to improve conservation, sustainability, livelihood security and management (2024-29)”**.

During the first two projects, the project had several outputs which formed key inputs for elasmobranch management policy in the country.

In this first issue of Kalpamatsya, we present an overview of two themes under the two projects:

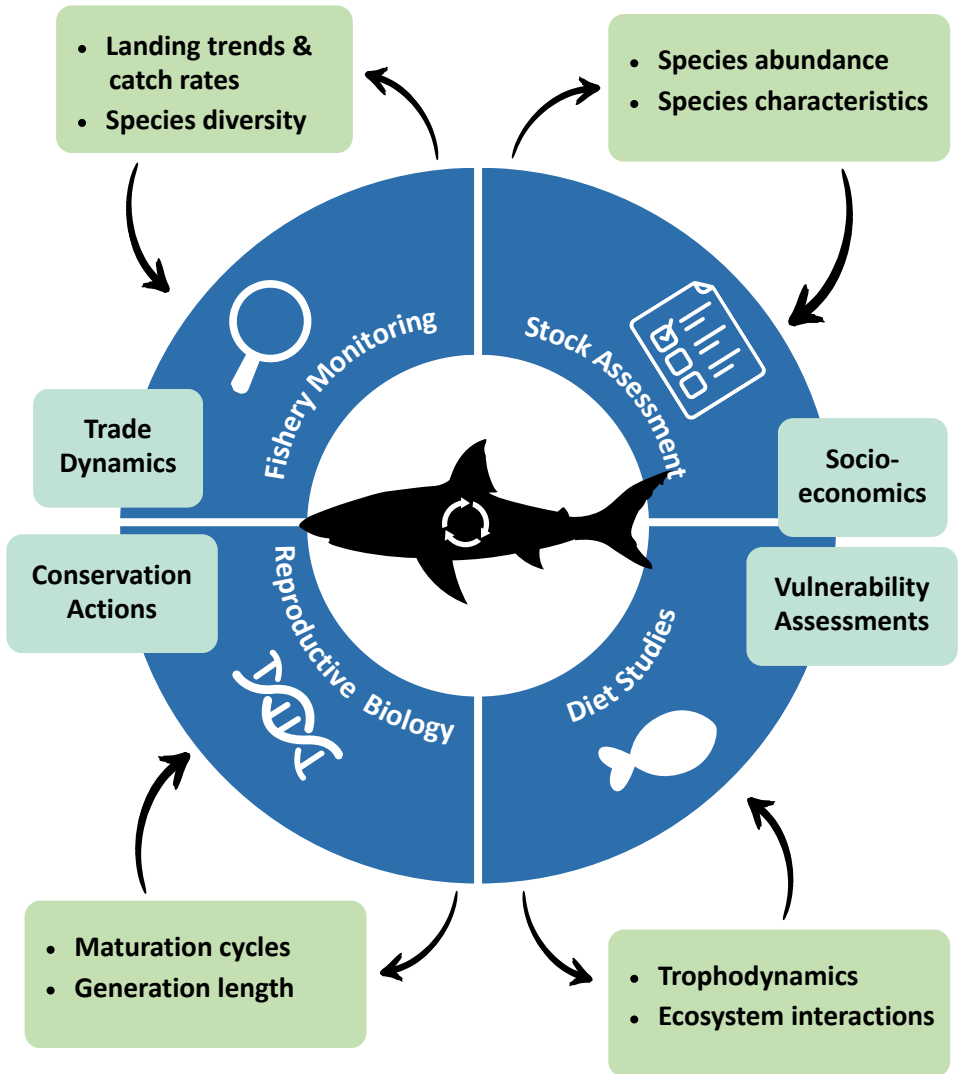
- Incidental landings of protected elasmobranch species in India
- Landings of rare elasmobranch species in India



ELASMOBRACH RESEARCH at ICAR-CMFRI



Shark Fishery Management & Conservation



Theme 1 – Monitoring the status of protected elasmobranchs in India

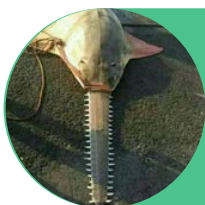
As of December 2022, the Wildlife Protection (Amendment) Act, 2022, provides protection to 26 elasmobranch species including sharks, rays and guitarfish in Indian waters.

As part of our research, the shark research team at ICAR-CMFRI, comprising scientists, survey personnel, and technical staff operating from a network of research centers, research stations, and field centers along the Indian coastline, has been monitoring the status of protected elasmobranch species. This involves creating awareness, documenting incidental landings, strandings, live releases, and the locations of capture and sightings.

In addition to collecting the location information, the team records all information possible including size and other morphometric features, sex, and the corresponding fishing gear. The ICAR-CMFRI team is also actively involved in raising stakeholder awareness regarding the status of protected elasmobranch species, as well as support in participatory conservation through release of live animals caught incidentally. The most frequently encountered protected elasmobranch species in Indian fisheries are guitarfishes and manta rays. Whale sharks receive significant media attention due to their enormous size, while sawfishes are very rarely encountered.



Whale shark sightings reported during 2012-2017 by ICAR-CMFRI



Incidental Landings

Reported from Kerala, Tamil Nadu, Maharashtra, Andhra Pradesh, Odisha

Back to Wild

Reported from Kerala, Karnataka Gujarat, Maharashtra, Andhra Pradesh



Stranding reports

Reports from all coasts



Shark Awareness day program organized for School Students

Theme 2 – Recording rare landings

India has over 170 species of elasmobranchs, not all of which are significant in quantity or value. The shark team at ICAR-CMFRI in addition to regular fishery landings, has also reported on rare species of elasmobranchs landed in Indian waters. Presented here is a compilation of some interesting reports. All the species listed below are either rare/not reported from Indian waters and these reports provide evidence of confirmed distribution of the species from the Indian EEZ. These reports are crucial in enriching the marine biodiversity database from the region as well as underlining the need for continued research and conservation efforts of these unique and very often, rare species.



Cow sharks of the Family Hexanchidae are considered to be one of the most primitive sharks. A rare landing of the bluntnose sixgill shark *Hexanchus griseus*, was reported in 2012 from Kollam in Kerala. The first report of the species from the Indian EEZ was only made in 2010, making this just the second report of the species from the region. The species is reported to grow up to 600 cm TL with body weight up to 590 kg!

Source: *Mar. Fish. Info. Serv. T & E Ser.*, 215: 31



The crocodile shark *Pseudocarcharias kamoharai* is the only species of the family Pseudocarchariidae. It is distributed globally in tropical regions where it inhabits the mesopelagic zone. Though presumed to be present in Indian waters, the first confirmed report was made only in 2010 from Kerala in south-west India (south-east Arabian Sea). The specimen was caught from area of 300-500 m depth in the Arabian Sea.

Source: *Mar. Biodivers. Rec.*, 6: p.e99

Following the first report of the crocodile shark from the Indian west coast, its confirmed presence from the east coast was reported in 2011 from Chennai, Tamil Nadu. This became the first report of *Pseudocarcharias kamoharai* from south-east India (south-western Bay of Bengal). Similar to the west coast, this specimen was also caught in areas of 300m depth by a deep-sea shrimp trawler.

Source: *J. M. Biol. Assoc. India*, 55 (1): 86-88



The first report of velvet dogfish *Zameus squamulosus* from Indian waters was reported in 2013 from south-west India (south-east Arabian Sea). The specimens were caught from areas of 350-450 m depth in the Arabian Sea. Belonging to the same family Somniosidae

Source: *Indian J. Fish.*, 60(3): 127-129



The broadfin shark *Lamiopsis temminckii* was re-described in 2017 based on specimens collected during 2013-2016. The authors brought forth clear differences in dentition between *L. temminckii* and the other shark of the same genus namely, *L. tephrodes*, which would help in field identification of the two species.

Source: *Zootaxa*, 4175(2): 155-166



The quagga catshark *Halaelurus quagga* is a deepwater catshark, which is named for its distinctive stripes similar to that of the extinct quagga. The species is very rare in Indian waters with only 9 specimens reported before. In 2017 landing of the rare Quagga catshark *Halaelurus quagga* was reported from Muttom, Tamil Nadu. The specimen was caught in a bottom trawl operating at depths of 150-200 m in Bay of Bengal.

Source: *Mar. Fish. Info. Serv. T & E Ser.*, 233: 28-29



The megamouth shark *Megachasma pelagios* is a large-sized deepwater shark, distinguished by its large mouth and small teeth. The species was reported to be landed at Thengaipattanam in Tamil Nadu in 2022. This was the first confirmed report from Indian waters.

Source: *Mar. Fish. Info. Serv. T & E Ser.*, 252: 34



The presence of Bennett's sting ray *Hemitrygon bennetti* was confirmed from western Bay of Bengal in 2019. The report extends the known distribution range of the species further westwards.

Source: *Acta Ichthyol. Piscat.*, 49:101-108



Critically Endangered stripenose guitarfish *Acroteriobatus variegatus* from south-west India (south-east Arabian Sea) was reported in 2019. Its description from Gulf of Mannar in 1973 by Nair and Lal Mohan.

Source: *J. Mar. Biol. Assoc. India*, 62(1):60-64



A rare occurrence of the giant stingray *Plesiobatis daviesi* was reported from Gulf of Mannar in 2022. The specimens were caught at areas of 300m depth and one of the specimens measuring 120 cm in width made it one of the largest specimens reported from Indian waters.

Source: *Mar. Fish. Info. Serv. T & E Ser.*, 258: 12-13

Success stories

The shark team at ICAR-CMFRI along with several other organizations is also actively engaged in raising awareness among the coastal communities regarding the endangered status of the whale shark and the need to help conservation actions by not targeting the fish, and by releasing live individuals that are accidentally entangled in fishing nets or are stranded live on shores, back to the sea. These awareness campaigns have had a positive impact in increasing the role of fishers in safely releasing whale sharks back to the sea, where they belong.



A whale shark was accidentally caught in a trawl net operating at a depth of 70 meters off Kochi. The shark was brought to Kalamukku fish landing center, Kerala, on May 23, 2013. The recorded size of the specimen was 5 meters. Fortunately, there were no apparent external injuries, indicating a very fortunate escape from severe harm and the specimen was released back to the Sea.



On 21 October 2015, local fishermen saw a whale shark, *Rhincodon typus*, caught in a Dol net off the coast of Gorai-Malvani in Maharashtra. This is the first reported case of a whale shark being rescued alive from such fishing gear in this region, making it a very important event in the conservation story of this majestic species. When the fishermen began their routine procedure of hauling in their net, they were surprised to find a gigantic creature trapped in the cod end. It was approximately 6.5 meters in length and made energetic movements by thrashing its tail against the walls of the net. The fishermen, who hold a deep reverence for this gentle giant—affectionately referring to it as “Deo Mushi” or “God Fish”—immediately sprang into action. With teamwork and determination, they worked tirelessly for over an hour, employing a knife to cut the 2mm twine entangling the creature, all while battling strong tidal currents.

Spotlight

Urogymnus asperrimus (Bloch & Schneider, 1801) Porcupine ray



German naturalists Marcus Elieser Bloch and Johann Gottlob Schneider described the porcupine ray (*Urogymnus asperrimus*) in their 1801 work *Systema Ichthyologiae*. Their description was based on materials obtained from Mumbai, India. Initially, they placed the species in the genus *Raja* and named it *asperrima*, meaning "roughest" in Latin, referencing its spiny or prickly texture due to dermal denticles, which serve as a defence mechanism. The name *Urogymnus* is derived from the ancient Greek words *oura* ("tail") and *gymnos* ("naked" or "unarmed"), referring to the ray's lack of a tail sting. Its dorsal side is marked with white and black spots spread across the upper disc.

The porcupine ray inhabits tropical and subtropical regions of the Indo-Pacific, commonly found in shallow coastal waters, sandy flats, lagoons, and coral reef areas. This species is distributed along both the east and west coasts of India, although it is relatively rare. An important habitat of the species is the Laccadive

Archipelago. It can grow up to 1.2 meters in width and approximately 2.4 meters in total length. In earlier times, the meat of the species used to be cured and was consumed in the states of Kerala, Tamil Nadu, Maharashtra, Gujarat, and Karnataka.

The porcupine ray faces severe threats from overfishing and habitat destruction. Its life history traits, including slow growth, late maturation, and low fecundity, add to its vulnerability. The species is currently listed as Endangered in the IUCN Red List and protected under Schedule I of the Wildlife (Protection) Act, 1972.

Indian Spurdog *Squalus hima* Sweta & Bineesh, 2024



Scientists from the Zoological Survey of India (ZSI) identified a new deep-water dogfish shark species, *Squalus hima*, in 2024 at the Sakthikulangara fishing harbor in Kerala, located in the Arabian Sea off southwest India. This species is known to inhabit the upper continental slope off Kerala, Kanyakumari, and the Wadge Bank area in the Arabian Sea. The discovery was part of a study under the Deep Ocean Mission, a special initiative by the Ministry of Earth Sciences, Government of India. *S. hima* is characterized by smooth dorsal fin spines, a short angular snout, a small mouth nearly as wide as the snout, the origin of its first dorsal fin located behind the pectoral fins, and a body without spots.

Dogfish sharks are valued for their meat, fins, and liver oil, with the latter being particularly sought after by cosmetics and pharmaceutical industries due to its high squalene content. Squalene is a key ingredient in high-end cosmetics and anti-cancer treatments. While *S. hima* resembles *S. lalandi*, it is distinguished by unique anatomical features, solidifying its status as a distinct species within the *Squalus* genus.

Viewpoint



Dr P. U. Zacharia
Former Head (Retd.)
Demersal Fisheries Division,
ICAR-CMFRI, Kochi

Insights on the current status, challenges, and future directions of shark research in India

Sharks (including sharks and rays) are resilient creatures that have continued to thrive in our oceans for more than 400 million years, surviving multiple mass extinctions by adapting to changing conditions and challenges. Today, they are among a long list of other endangered species around the world that face new threats including fishing, pollution and climate change. Despite contributing only 1-3% of the annual marine fish landings in India, sharks play a crucial role in the marine ecosystem. As apex predators they help maintain biodiversity by regulating the populations of different marine creatures, such as reef fish, invertebrates, and mammals. Without sharks, the delicate balance within the ecosystem could be disrupted, leading to cascading effects on marine life. Their role in controlling prey populations, maintaining biodiversity, and indirectly supporting habitat health highlights the significance of protecting and conserving shark populations.

India is the world's second-largest producer of sharks, after Indonesia. With over 175 species in 44 families, the shark diversity in India's coastal waters is astounding. Due to their poor growth and reproduction rates, as well as their lengthy generation times,



sharks are particularly vulnerable to overexploitation and population decrease. Most shark populations, particularly those of large species, do not rebound as quickly as other fishes from the decline in their numbers brought on by fishing.

The major threats faced by sharks in India today include overfishing and declining landings (even as bycatch), intensification of deep-sea fishing (especially in the southeastern Arabian Sea), increasing demand for shark products, especially meat of neonates and juveniles, and climate change which affects their migration patterns leading to alterations in the ecosystem dynamics.

Many coastal communities in India have traditionally relied on sharks as a source of nutrition and livelihood. Shark and ray populations support artisanal, small-scale and semi-industrial marine fisheries, providing income and employment opportunities for fishing communities along the Indian coast. Their meat is predominantly used for consumption within the country by economically backward sections of the society.

While ICAR-CMFRI has a long legacy of shark research in India beginning in the early 1950s, the activities got a big impetus in 2012 when a dedicated research programme was initiated in the Institute under its Demersal Fisheries Division, with greater focus on status assessments and conservation, in line with global actions on a resource which were threatened by human exploitation.

The research from 2012 onwards yielded several significant outputs that contributed to furthering knowledge on the status of sharks and their conservation concerns in India. *The Guidance on National Plan of Action for Sharks in India* (2015) in line with FAO's International Plan of Action for Sharks formed the base for preparation of the NPOA-Sharks in India. Initiatives such as outreach materials in English, Hindi and vernacular languages of the coastal states, like Gujarati, Marathi, Kannada, Malayalam, Tamil, Telugu, Odiya and Bengali, helped in awareness drives among stakeholders to support conservation of vulnerable, endangered and protected species. Several national and international workshops and meetings were conducted, the most significant among them being the *Global Expert Meeting on Collection and Reporting on Use, Market and Market Chain Information for Shark and Ray Commodities* held in July 2019 in



collaboration with FAO, and the *National Consultative Workshop on Threatened and Protected Elasmobranchs of India: Conservation status and Policy* needs held in February 2020 which engaged research experts, managers, policy developers, and relevant government representatives working to improve the conservation, sustainable utilization of sharks in India.

Other noteworthy outputs of the research include Field identification of batoids—a guide to Indian species for field level identification of about 60 species of batoids including sawfishes, guitarfishes and rays, *Non-detriment findings* (NDF) of seven species of sharks (mako shark, silky shark, threshers, hammerhead sharks, white tip shark, rays (mobulas and mantas) and bow mouth guitarfish as part of the CITES requirement, *Study of shark and ray non-fin commodities in India* – Report of a collaborative project supported by FAO, Rome, *Elasmobranch conservation, challenges and management strategy in India: recommendations from a national consultative meeting*— a policy support peer-reviewed article providing a critical analysis of the issues in elasmobranch conservation and *Shark consumption in India: An exploratory study on trends and awareness* – a peer-reviewed article detailing the findings from a first national study on shark consumption in India.

Future line of action

In order to effectively develop suitable management strategies for shark conservation in India, there are several challenges that need to be addressed. Firstly, it is crucial to undertake a comprehensive revision of the nomenclature and taxonomy of many shark species. This is vital to clarify any existing taxonomic ambiguities, and one way to achieve this is through molecular genetic studies. Genetic population studies are essential for gaining insights into population boundaries and subpopulation structures.

There is also an urgent need for improved information regarding the stock and migration patterns of sharks. Currently, our knowledge in this area relies heavily on fisheries-dependent studies, which offer limited data. To overcome this limitation, it is imperative to combine both fisheries-dependent and independent methods to estimate stocks accurately.



By integrating updated taxonomy, genetic information, and a holistic approach that combines both types of studies, we can lay the foundation for robust shark conservation strategies in India. Addressing these challenges will provide a more comprehensive understanding of population dynamics, migratory patterns, and the ecological roles of elasmobranchs. This, in turn, will empower us to make well-informed decisions and foster collaborative efforts aimed at ensuring the long-term survival of these essential marine species. India's conservation effort has played a positive role in creating awareness and protecting species like whale sharks. There are several recent instances of fishermen releasing back whale sharks accidentally entangled in their nets.

I am very happy to learn that ICAR-CMFRI is bringing out a biannual Shark Science Digest titled *KALPAMATSYA – THE SHARK*. The term *kalpamatsya* aptly suits sharks as every part is utilized in one way or other – the flesh in fresh or dry form is utilized for human consumption; fins are used for making fish soup; shark skin is considered as food delicacy in many Asian countries; shark and ray skin also used for making shoes, belts handbags; shark teeth and jaws are used as curios and tools; shark liver oil is used as a lubricant and a source of Vitamin A; squalene extracted from shark liver oil is used in pharmaceuticals and cosmetics; and gill plates of rays are used for certain medicines. These, and the ecological importance of sharks underscore the need for conserving the resource. I hope that *Kalpamatsya* will act as a platform where latest research on elasmobranchs is showcased and scientists and researchers share their experiences and insights on various aspects of shark research, fisheries, trade, conservation and management in India and abroad. This publication, no doubt will definitely help to manage and protect the shark resources in India and I wish this endeavour by the Finfish Fisheries Division of ICAR-CMFRI a great success.



Dr Sujitha Thomas
Head & Principal Scientist
ICAR-CMFRI Mangalore Regional Centre,
Hoige Bazar Mangalore,
Karnataka-575001

Elasmobranch Conservation and Research in India: Progress, Challenges and Road Ahead

Sharks, often dubbed the "guardians of the ocean," are among the most fascinating and misunderstood creatures on Earth. With a lineage stretching back over 400 million years, these ancient predators have not only witnessed the rise and fall of the dinosaurs but have also played a pivotal role in shaping marine ecosystems throughout history. Their remarkable adaptability and resilience make them one of the most successful survivors in the evolutionary timeline.

The significance of sharks extends beyond their evolutionary marvel. As apex predators, they help maintain the delicate balance of marine food webs by controlling populations of prey species, ensuring the health of ecosystems that millions of organisms, including humans, depend upon. Sharks also serve as indicators of ocean health, their presence reflecting the vitality and biodiversity of marine habitats. However, despite their ecological importance, sharks face unprecedented threats from human activities. Overfishing, habitat degradation, and climate change have led to a dramatic decline in shark populations worldwide, jeopardizing not only their survival but also the stability of marine ecosystems. Understanding sharks' evolutionary journey, ecological role, and the importance of their conservation is crucial for fostering a sustainable coexistence with these remarkable creatures.



Sharks are one of the most diverse groups of vertebrates, with over 1000 species ranging from the tiny dwarf lantern shark, barely the size of a human hand, to the colossal whale shark, the largest fish in the ocean. This incredible diversity is reflected in their wide array of habitats, from shallow coral reefs to the deep ocean, and their varied roles in marine ecosystems. Studying sharks is vital not only to understand their ecological functions but also to unravel their evolutionary adaptations, such as their keen sensory systems, efficient predatory skills, and unique reproductive strategies.

Shark fisheries are a crucial, yet highly contentious, facet of the global fishing industry. Sharks are caught for various products, including meat, cartilage, liver oil, and particularly their fins, which are sought after in parts of Asia for delicacies like shark fin soup. The industry supports livelihoods in many coastal communities, providing significant economic benefits. However, the demand for shark products has led to overfishing and a severe decline in shark populations worldwide. This has raised alarm among conservationists and marine biologists, who stress the need for sustainable practices and effective management to ensure the survival of these ancient predators. International concern over the sustainability of shark fisheries started to build in the late 1980s and early 1990s as shark fisheries expanded globally in response to lucrative shark fin. Global shark research has gained momentum as scientists delve into these aspects, exploring migration patterns, feeding behaviours, and population dynamics. Advanced technologies like satellite tagging and genetic analysis have revolutionized our understanding of their movements and interactions with the environment. Worldwide, research institutions and conservation organizations are joining forces to combat the threats of overfishing and habitat destruction, ensuring the survival of sharks and the stability of marine ecosystems. This growing body of research underscores the urgent need for conservation measures, aligning with the broader recognition of sharks' ecological and evolutionary importance.

The Central Marine Fisheries Research Institute (CMFRI) has been significantly contributing to the conservation research of elasmobranchs (sharks, rays, and guitarfishes) in India. The institute focused on sustainable development and management of marine resources since its inception. Notably, CMFRI initiated a dedicated national project on elasmobranchs in 2012, prompted by declining shark populations and the importance of these species to Indian fisheries. The efforts include multiple in-house and externally funded projects centered on elasmobranch fisheries and conservation. conducted extensive assessments of marine biodiversity in Indian waters. The research has generated valuable baseline data on the distribution and abundance of elasmobranchs, helping to identify species that are most at risk. Stock assessment studies for various elasmobranch species, provided insights into population sizes, growth rates, and exploitation levels which are essential for developing effective management. Partnerships with national and international organizations to enhance research capacity and share knowledge on elasmobranch conservation has facilitated data sharing, technological advancements, and access to broader research networks.

Through education and awareness programs, significant progress has been made in raising awareness among stakeholders—including fishermen, policymakers, and the general public. Furthermore, work is also done for policies and international agreements like CITES to ensure that trade does not threaten elasmobranch populations.

The extensive research findings have been documented, emphasizing the conservation of protected species under India's Wildlife (Protection) Act and promoting awareness among fishermen on sustainable practices. The efforts have helped in gaining information on the species diversity, biology and population dynamics of elasmobranchs in India.

Shark research in India faces several challenges, which are multifaceted and deeply rooted in various socio-economic, environmental, and logistical factors. Limited conservation-relevant research, often fragmented and regionally biased, results in gaps in comprehensive data crucial for effective conservation. Because of the multispecies, multi-gear fishery in India, there is a significant lack of continuous data and long-term monitoring programs, making it challenging to accurately understand population trends and threats. Reliable data is crucial for formulating effective conservation strategies.

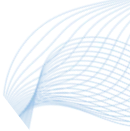
Elasmobranchs are crucial for the health of marine ecosystems and the sustenance of local fisheries. Research efforts led by organizations like CMFRI are vital for the protection and conservation of these species in India. By developing comprehensive research frameworks that include shark tagging, population studies, and habitat preference studies, India can pave the way for effective management strategies. Through collaborative efforts, sustained research, and community engagement, it is possible to enhance the conservation of elasmobranchs, ensuring their ecological roles are preserved for future generations.

Conservation corner



Empowering Conservation: Fishermen Release Entangled Whale Shark in Odisha

The whale shark (*Rhincodon typus*) is listed under Schedule I of the Wildlife (Protection) Act, 1972, in India, granting it the highest level of legal protection. On August 12, 2021, a 15-foot-long female whale shark became entangled in fishing net approximately 12 kilometers off the Paradip coast in Odisha. Fishermen intervened to save the shark by cutting the net and releasing it back into the sea. Similarly, local fishers rescued a whale shark stranded in Ganjam district on February 25, 2021, and another in Balasore district on March 5, 2021, ensuring their safe return to the ocean.



Conservation in Action: Fishermen off Koyilandy Rescue and Release Whale Shark

A whale shark *Rhincodon typus*, accidentally caught was released by the fishermen who were engaged in trawl fishing off Koyilandy, Calicut. Fishermen of the trawl boat DEVASARATHI (Reg. No. – IND.KL.07.MM.5289) operating from Puthiyappa fishing harbour, Calicut spotted a whale shark entangled in trawl net during the fishing voyage on 25/01/2020 at around 7 pm. The whale shark measuring about 5m length and weighing 900-1,000kg was accidentally caught in the net around 22 nautical miles off Koyilandy at 15m water depth. Fishing crew onboard namely Shri Babu, Shri Sandeep, Shri Abilash, Shri Shiju, Shri Sumesh, Shri Suni, Shri Vishak, Shri Anannadhan, and Shri Kripesh put effort to release the whale shark back to sea.

One among the boat owners, Shri Kuttan explained that fishermen had to cut the trawl net worth of Rs. 1 lakh rupees, and the operation took nearly 40 minutes to rescue the whale shark back to sea. It would cost Rs. 40,000/- to repair the damaged net. Two fishermen had injuries while saving the endangered shark. These fishermen were aware of the endangered elasmobranchs which are protected under the Indian Wildlife (Protection) Act through the awareness created by the Central Marine Fisheries Research Institute in recent days after a whale shark was accidentally caught by fishermen in Ponnani, Malappuram district in August 2019. CMFRI organized an awareness programme on conservation of protected elasmobranchs on International Whale Shark Day on 30/08/2019 at Ponnani. Later on, 24/09/2019 CMFRI held a Stakeholders' Meet with fishermen and fish merchants on the trade of Sharks and Rays. CMFRI advised the fish merchants to refrain from buying any endangered elasmobranchs protected under the Indian Wildlife (Protection) Act 1972.



Awareness was also created on the protection of Corals, Sponges, Fishes, Sea horse, Chanks, Sea cucumbers, Sea cow, Dolphins, etc under the Indian Wildlife (Protection) Act 1972 during the training programme.

The fishermen urged the Fisheries and Forest Department to consider the effort taken and suitably compensate for the loss due to the damage of their fishing net.

Community-Driven Conservation: Awareness Efforts Lead to the Safe Release of Protected Widenose Guitarfish

The Widenose guitarfish (*Glaucostegus obtusus*), a small coastal elasmobranch, is frequently caught as bycatch in various fisheries. This study highlights two recent instances of incidental entanglement observed in March 2024 by researchers from ICAR-CMFRI at fish landing centers in Karnataka. The first case in Gokarna involved a live male guitarfish caught in a gillnet, which was safely released after intervention by a scientist. A subsequent case in Karwar demonstrated the impact of awareness efforts when informed fishermen voluntarily released a female guitarfish. These events underscore the role of outreach and education in enhancing conservation outcomes for protected marine species.

Case Reports:

During routine surveys in March 2024, ICAR-CMFRI researchers recorded two notable instances of Widenose guitarfish entanglement:

Gokarna Landing Center Incident:

- A mature male (65 cm) was caught in a gillnet.
- Fishermen were unaware of its protected status.
- Upon intervention by Dr. Mahesh V., the specimen was released, and an awareness article was published in *Karavali Munjavu*.

Karwar (Aligadda Beach) Incident:

- A mature female (74 cm) was caught in a fishing net.
- Fishermen, informed through previous outreach efforts, voluntarily released the specimen.
- This incident was reported to ICAR-CMFRI, reinforcing the impact of conservation awareness.



Live release of whale sharks at Trivandrum, Kerala: Shining examples of community awareness

Whale Sharks, are now frequently observed along the coastal stretches of Adimalathura, Poonthura, and Shanghumugham of Trivandrum districts. Between 2022 and 2025, approximately 42 whale sharks have been rescued and safely released back into the sea, thanks to the coordinated efforts of local authorities and the active leadership of citizen scientist Mr. Ajith. The fishers of Trivandrum coast rescued and released, accidentally entangled whale shark at Adimalathura, Poonthura, and Shankumugham beach recently. At Adimalathura about 25-30 foot female whale shark was rescued by the fishers, whereas the fishers of Poonthura rescued a whale shark around two km from the shore. Whale sharks were brought to the shore by shore seining around 1-2 km from the shore. Around 40-50 fishermen were involved in the rescue process. The fishers from the coast alerted the Forest and Fisheries department to protect these endangered fishes. The entire team reached the spot and assisted the fishers in cutting the net and carefully releasing the fish back to sea. The filter-feeding whale sharks migrate across the tropical and warm temperate seas and are regular visitors along the Indian coastline. As part of its awareness initiatives, ICAR-CMFRI, Fisheries department and NGO's has been actively engaging with fishing communities to raise awareness about the ecological significance of Whale Sharks, the dangers threatening their survival, and the importance of protecting them. True conservation success hinges on the involvement of local communities. When communities unite and collaborate, meaningful conservation outcomes become possible. The voluntary release of whale sharks by fishers stands as a powerful evidence which reflects the positive impact of awareness campaigns.



Vypin Incident:

- Breeding season: October–December; neonates, pregnant females, and adults frequent shallow sandy shores (0–2 m depth).
- Conservation significance: Neonates are critical for population recovery due to the small litter size (5–6 pups).
- Awareness impact: Reinforces the importance of educating stakeholders, fishers, traders and officials for more such successful conservation actions.

These cases highlight the importance of education in marine conservation. The proactive response from fishermen in Karwar exemplifies the success of targeted awareness campaigns. Future conservation strategies should emphasize continued engagement with fishing communities, reporting mechanisms for accidental catches, and collaboration with fisheries and forest departments to strengthen compliance with conservation laws.



Shark tales



Evolution of Shark fishing and preservation techniques in India

Historically, sharks were primarily caught for their meat and liver. In the past, there was no dedicated or organized shark fishery in India, and sharks were mostly captured incidentally as bycatch in traditional fishing gear. Until the late 1960s, during the pre-trawl era, shark fisheries remained largely neglected, primarily because shark meat was not a preferred edible choice due to its strong odour, caused by the presence of trimethylamine. Despite this, shark liver oil had been utilized for centuries as a traditional remedy, valued for its wound-healing properties and therapeutic benefits for respiratory ailments. Rich in essential nutrients, including vitamins A, D, and E, as well as Omega-3 fatty acids like EPA and DHA, shark liver oil remained an important medicinal resource.

However, in the early 1980s, shark meat began gaining popularity in both domestic and international markets, driven in part by the rising global demand for seafood. The high commercial value of shark-derived products such as fins, liver oil, cartilage, and skin further incentivized fishermen to engage in targeted shark fishing. This trend intensified with the introduction of sophisticated fishing trawlers and an increasing export demand for shark products, particularly during the trawl-dominant period of the 1980s. The demand for shark fins surged when China began importing them as a key ingredient for shark fin soup, a prized delicacy.

his growing demand led to indiscriminate shark fishing, transforming sharks into a valuable commercial catch in India. Fishermen equipped their boats with specialized gear to exploit shark stocks and meet the soaring international demand. Several East Asian countries, including Singapore, Taiwan, Malaysia,

and Indonesia, began importing shark fins from India and subsequently re-exporting them to China. Today, India is one of the largest exporters of shark fins to China and other East Asian nations. As shark fishing intensified in recent years, India has emerged as the second-largest shark-producing country in the world.

While large sharks became the primary target of commercial fisheries, smaller species such as *Scoliodon laticaudus*, *Rhizoprionodon oligoinx*, and *Rhizoprionodon acutus* are predominantly caught using gillnets along the Indian coast, where their meat is highly sought after in local markets. During peak fishing seasons, surplus catches are preserved through traditional salting methods to maintain supply during lean fishing periods, particularly from June to August on the west coast and April to June on the east coast of India, when mechanized fishing is prohibited.

To meet the growing demand and extend the shelf life of shark meat, fishermen in India have long relied on traditional fish preservation techniques. Methods such as sun-drying, salting, smoking, and acid curing have been practiced for centuries, forming the foundation of traditional fish processing across cultures. These relatively simple techniques date back to prehistoric times and continue to be widely used. In India, salted and sun-dried fish products are the most common, while fermented fish products are primarily consumed in the eastern regions.

The traditional fish preservation techniques widely practiced in India include Sun drying, Dry salting and *Mona* curing, Wet salting, Pit curing, Colombo curing and Smoking and drying (*Masmeen* method). Salting is a particularly effective preservation method, often serving as a preparatory step before sun-drying or smoking. Various salting techniques, named differently across regions, can be broadly categorized into three main types: **Kench Curing** – In this dry salting technique, salt crystals are applied to the flesh side of dressed fish, which is then stacked to allow moisture to drain away. This method is ideal for lean fish but unsuitable for fatty fish, as oxidation leads to rancidity. When lean fish like cod is lightly salted, the method is known as the "*Gaspe*" cure. **Pickling** – Another dry salting method where the extracted moisture is retained, forming a self-brine in which the fish remains

immersed. Brining – A wet salting technique where fish is soaked in a highly concentrated salt solution. The Kench curing method has been traditionally used to preserve shark meat in India.

Sharks in India are primarily utilized for their meat, which enjoys strong domestic demand in both fresh and dried forms across coastal states. Shark meat is especially popular in Tamil Nadu and Kerala, while ray meat, though consumed, has comparatively lower acceptance. Salted and dried shark meat cubes are widely consumed in Tamil Nadu, Kerala, Karnataka, and the northeastern states. Additionally, these products are exported to Sri Lanka and various Southeast Asian countries, further strengthening India's position in the global shark trade.



Harvesting and preservation of excess smaller shark catches



Evisceration of sharks



Incision or slicing open of the shark



Internal salting of the incised shark



Stacking of the shark



The entire stack of sharks was fully enveloped in salt



The shark absorbs the salt



Rinsing the sharks to remove excess salt



Sun-drying the shark to eliminate excess moisture content

Share your stories



J. Vincent Jain,
Former Chief Executive- AD SGAF,
Former Deputy Chief Executive-SIFFS,
Chairman and Head-R & D,
Centre for Rural Innovation and
Technology Development,
www.critechindia.com

The Deep-Sea Fishing Community of Thoothoor and the Quest for Sustainability

The Thoothoorkare area in Kanyakumari district, Tamil Nadu, was renowned for its shark and deep-sea fishing expertise. Fishermen from this region demonstrated exceptional skill and bravery in venturing into the open ocean. Interestingly, the versatility of sharks echoes the characteristics of the coconut tree, known as "Kalapa Vriksham" in Sanskrit, which translates to the tree that provides all necessities. This unique parallel may have inspired the CMFRI to title its biannual publication, "Kalpamatsya – The Shark."

The Thoothoor area fishermen migrate from Kanyakumari (Tamil Nadu) to Okha (Gujarat) for shark fishing (Table 1). Accompanying them are local merchants who provide essential

support, including accommodations, food, and fishing equipment. These merchants also purchase the fishermen's catch and connect with exporters. The shark meat is often preserved with salt and sold directly to markets (Table 2), while other shark parts are sold at varying prices (Table 3).

In this backdrop, the ban on sharks and 60 other species imposed in 2021 by the Ministry of Environment and Forest, Government of India (MoEF-GoI), sparked widespread protests among fishermen. The ban, enforced under the Wildlife Protection Act of 1972, prohibited catching, harvesting, trading, or processing these species for sale, with possession considered a punishable offense. Shark fishing was a long-standing livelihood for Indian fishermen, particularly those from the Thoothoor region. When the government imposed a ban, fishermen from this region organized protests and demonstrations in Delhi*, ultimately revoking the ban. The Kanyakumari District Deep Sea Artisanal Fishworkers Union (KDSAFU), affiliated with the National Fishworkers Forum (NFF), and the Association of Deep Sea Going Artisanal Fishermen (ADSGAF), affiliated with SIFFS, played a pivotal role in forming the Action Forum Against Ban on Shark and Other Sixty Items[#].



Removing the cartilage from Shark



Salting Shark meat

* We would like to extend our heartfelt gratitude to Mr. Krishnakumar from WWF, Delhi, for his invaluable support to the fishermen who converged in Delhi to protest against the unjust ban on shark fishing

[#] National Convener of the Action Forum Against Ban on Shark and Other Sixty Items was the Author of this article



Salted Shark meat

Interestingly, many fishermen were unaware of the ban until they were stopped and questioned by the Indian Coast Guard at mid-sea. This lack of awareness highlighted the absence of proper consultation with key stakeholders, including the nodal agency CMFRI, FSI, fishermen leaders, and organizations, before imposing the ban.

In the name of conservation and management, unilateral decisions are unacceptable. As stakeholders who depend on these resources for their livelihood, fishermen also bear responsibility for conserving them. Decisions must be made through collective discussion and collaboration. Furthermore, established formalities must be followed before implementing any regulation or law. Despite sensational claims by some NGOs and media outlets, there is no concrete evidence to implicate Indian fishermen in the over-exploitation of sharks and the inhumane practice of finning. Fishermen consider sharks as 'Kalpamatsya', where every part holds value, and therefore, they do not engage in the wasteful practice of finning. On the contrary, fishermen have been unfairly vilified for an issue they are not responsible for. In reality, fishermen are the best custodians of marine resources, as their livelihoods depend on the long-term sustainability of these resources. They have a vested interest in conserving and managing them responsibly.

Foreign fishing vessels are likely the primary perpetrators of shark finning and waste. We urge NGOs and media outlets to rely on verifiable data and avoid perpetuating unsubstantiated claims that

harm the reputation of Indian fishermen and undermine their legitimate livelihoods. Following the revocation of the ban, the two organizations KDSAFU and AD SGAF, in partnership with CMFRI, MPEDA, Netfish, HIS*, and BoBP-IGO, facilitated numerous consultative meetings and awareness programs. As a result, targeted shark fishing has ceased among both Thoothoor area fishermen and the broader Indian fishing community. It shows the responsibility of the fishermen in conserving and managing their resources. Fishermen are cooperative and willing to adapt when properly informed, educated, and made aware of the issues. However, this approach is often overlooked; instead, decisions are imposed upon them, leading to protests, agitations, and unproductive meetings. The Thoothoor area fishermen are renowned globally for their expertise in deep-sea fishing, particularly longline and gillnet fishing. It is the government's responsibility to protect and support their occupation with practical and tailored schemes. Examples of successful government initiatives include the Coir Board and the Jack Fruit Promotion Council, which demonstrate how targeted support can benefit specific industries. Conversely, deep-sea fishermen have received negligible support, with a lack of meaningful government initiatives or follow-through on proposed projects.

The author attempted to meet with shark merchants from the Thoothoor area but found that most had closed their businesses. Only one merchant was available for a meeting, and a few photographs were obtained from their center, which are featured here. The biannual publication, Shark Science Digest: "Kalpamatsya – The Shark." Launched by CMFRI is commendable, and wish the publication great success.

References

1. J.Vincent Jain, S. Carmel, "Shark Fishers Summit 2002", Association of Deep Sea Going Artisanal Fishermen, December 2002
2. Jain. J.V, 2002: People's Movement Against a Ban on Shark Fisheries-A Success Story" Das Xavier & Yadava YS (eds.), Association of Deep Sea Going Artisanal Fishermen

Table 1**Shark landing centres across coastal states of India**

Sl.No	Place	State
1	Kanyakumari	Tamil Nadu
2	Vizhinjam	Kerala
3	Quilon	Kerala
4	Kochi	Kerala
5	Kozhikode	Kerala
6	Kannur	Kerala
7	Kasargode	Kerala
8	Manglaore	Karnataka
9	Malpe	Karnataka
10	Gangoli	Karnataka
11	Panjim	Goa
12	Ratnagiri	Maharashtra
13	Vijayadurga	Maharashtra
14	Alibagh	Maharashtra
15	Mumbai	Maharashtra
16	Veraval	Gujarat
17	Porbander	Gujarat
18	Dwaraka	Gujarat
19	Okha	Gujarat

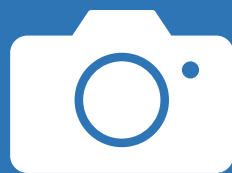
Table 2. Major shark meat markets

Sl.No	Place	State
1	Kottayam	Kerala
2	Changanasery	“”
3	Athirampuzha	“”
4	Alapuzha	“”
5	Thalaseri	“”
6	Kozhikode	“”
7	Manglore	Karnataka
8	Trichy	Tamil Nadu

Table 3. Products made from sharks

Sl.No	Parts of Sharks	Products
1	Meat	Food
2	Fins	Soup
3	Teeth, Jaws	Ceremonial Objects
4	Cartilage	Medicine, Fish meal
5	Liver Oil	Vitamins, Cosmetics, Lubricant
6	Skin	Leather

Shark gallery



Fishery & Trade





Fishery & Trade

Fishery & Trade





Fishery & Trade

Shark quest



Find 15 shark name in 60 seconds

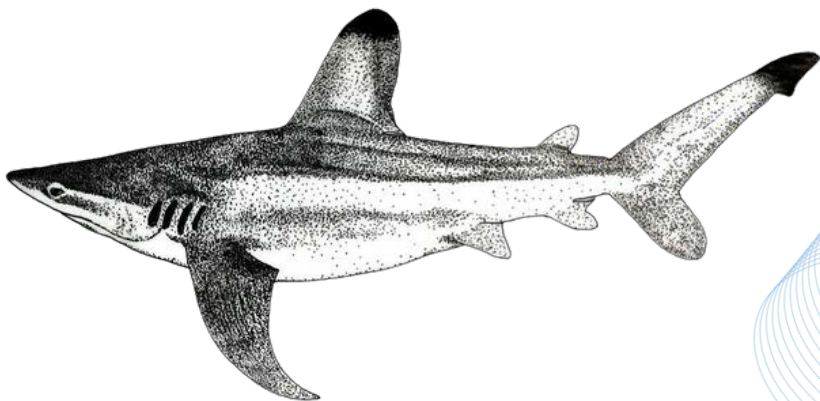
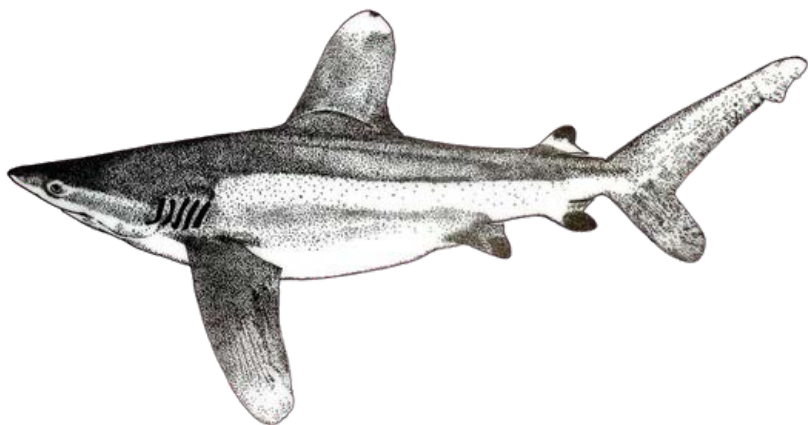
Names can run horizontally, vertically and diagonally, both forwards and backwards.

R	E	H	S	E	R	H	T	A	M
S	I	L	K	Y	Y	K	S	U	D
B	L	A	C	K	T	I	P	O	W
K	O	S	A	W	D	N	U	O	H
U	W	M	O	A	O	D	F	X	A
M	I	L	K	Y	G	A	N	G	L
T	R	L	T	I	G	E	R	S	E
A	R	U	E	Z	A	N	G	E	L
C	X	B	S	P	I	N	N	E	R
B	A	M	B	O	O	T	R	A	L

Do you know?

- Sharks that dwell near the bottom have sharper eyesight compared to those on the surface
- Unlike human a shark's nostrils, used for sensing smells, are not linked to its gills or mouth
- Sharks don't chew their food; instead, they slice their prey into pieces and swallow them whole
- Sharks continually shed their teeth and replace them with new ones
- Sharks are fast swimmers than bony fishes due to their lighter cartilaginous skeleton

Spot the difference !



Shark shop



Order high-quality shark posters for just ₹50!



₹ 100



₹ 250



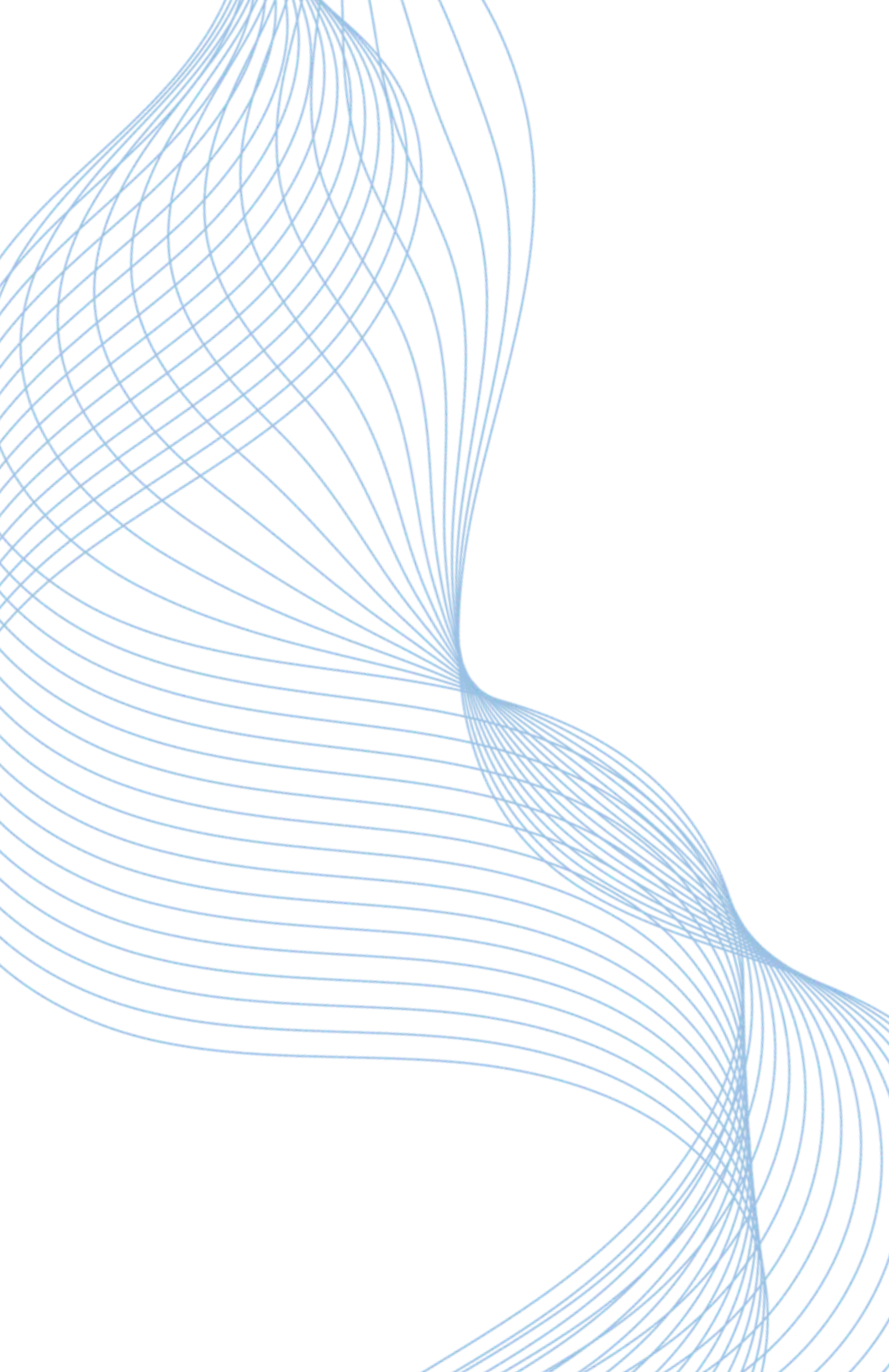
₹ 100

ORDER NOW

For details contact:

Mob. 8089181185

Email: kalpamatsya@gmail.com



The name Kalpamatsya, a combination of the Sanskrit words Kalpa representing the eternal cycle of time and Matsya meaning fish, translates in English as the timeless fish; a fitting name for sharks, an enduring group of fish transcending eras, thriving through time and persisting still the coexisting dominant and abundant teleost lineage is believed to have evolved around 150 million years ago. Sharks have existed on Earth for more than 400 million years, pre-dating dinosaurs, and have evolved across mass extinction events to thrive in diverse marine ecosystems. As apex predators with advanced sensory systems and remarkable hunting skills, sharks are keystone species that play an important role in maintaining balance in the aquatic world. This shark digest from India is thus named Kalpa Matsya recognizing the timelessness of sharks and also anticipating that the information contained within will ensure that sharks continue to be part of the earths ecological future.

Precambrian

Paleozoic

Mesozoic

