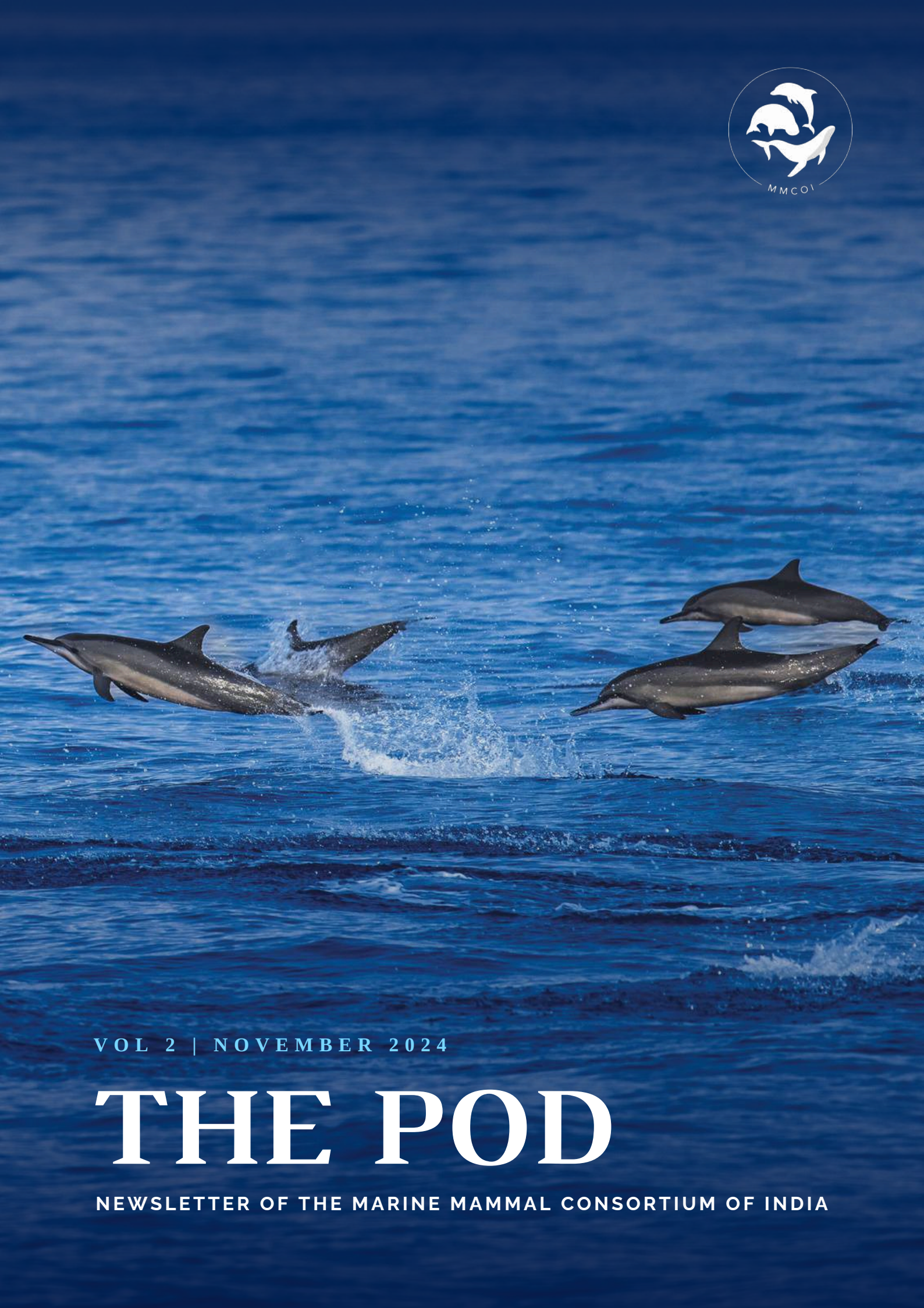

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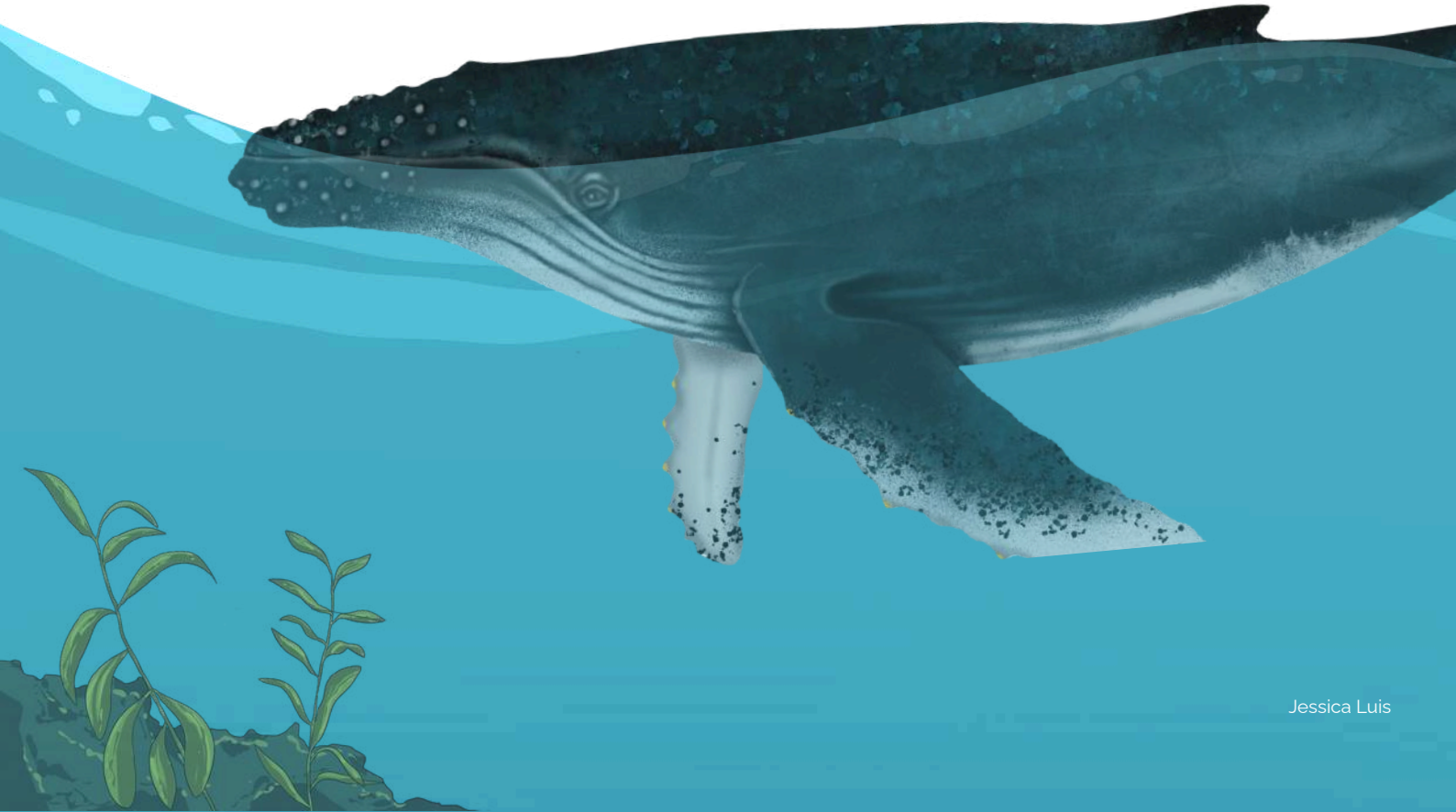
THE POD

NEWSLETTER OF THE MARINE MAMMAL CONSORTIUM OF INDIA

Contents



Jessica Luis

EDITORIAL

Anant Pande and Rohan Arthur

Hello dear readers! (Click-whistle-squeak)

Welcome back to *The Pod*, the voice of the Marine Mammal Consortium of India (MMCOI). Rewind to last November, when the MMCOI family came together in Bengaluru for our first-ever in-person meeting. Amidst the buzz of shared ideas and vibrant conversations, one question emerged as the elephant—or rather, the whale—in the room: How do we sustain this consortium? Not just for today or tomorrow, but long enough to leave an indelible mark on our mission.

From brainstorming voluntary networks to exploring rotational leadership, government anchoring, and even semi-structured models, we debated the best way forward. Ideas flowed like a tide, ranging from pooling resources—both financial and in-kind—to establishing voluntary working groups to keep this ship afloat. Across the board, one sentiment echoed loud and clear (much like the chatter in a dolphin pod): We need to make this work!

In a rapidly evolving world like ours—especially in a country where the push for development often runs headlong into conservation priorities—collaboration isn't just a buzzword; it's a lifeline. MMCOI's mission as a hub for partnerships offers us a golden opportunity: to turn lofty ambitions into tangible outcomes for the marine mammals we cherish and the ecosystems they call home. Together, we can move mountains—or, perhaps more aptly, cross oceans.
MMCOI aspires to stem the lack of knowledge that is often marine conservation's Achilles' heel. For most cetacean species, we are still struggling to understand where they live, let alone how many exist. Even the best-studied species, like humpback dolphins, leave us grappling with more questions than answers. Bridging these gaps is crucial, information is key, and our collective expertise offers hope.

This second issue of The Pod is brimming with stories that are sure to make waves. From the lush mangroves of the Sundarbans to the deep waters off India's east coast, this edition is a deep dive into the extraordinary efforts of marine mammal researchers.

Jessica Luis

Travel to the Sundarbans, where our contributors spotlight the threats of plastic pollution and ghost nets to vulnerable species. Embark on a visual odyssey through the waters of India's east coast, where cetaceans play a tantalising game of hide-and-seek with researchers. The 'From the Galleys' section showcases 15 remarkable studies from the past year, covering everything from stranding investigations to seagrass assessments for elusive sea cows and threats to endangered river dolphins.

Don't miss the gripping tale from Goa's coastline that unravels the tug-of-war between scientific inquiry and human biases in decoding dolphin behaviour, or the study on the Indian Ocean humpback dolphins and their intriguing interactions with fishing vessels—an evolving story of coexistence. And for those who love a good brain teaser, there's a fin-matching game brought from the salty waters of Chilika Lagoon that promises challenge and delight in equal measure.

So, dive in, explore, and let these stories inspire you to make a splash in the world of marine mammal conservation.

FEATURE

Marine fauna strandings in the Sundarbans mangroves: A silent peril transforming coastal biodiversity

Punyasloke Bhadury

The Bay of Bengal (BoB), one of the large marine ecosystems (LME), is home to rich coastal biotopes sustaining the livelihoods of millions of coastal communities and contributing to the blue economy. One of the most prominent coastal biotopes that is widespread along the coastlines of BoB is the mangrove forest. From a global perspective, the Sundarbans mangroves, located at the apex of BoB have immense ecological and socio-economic significance. The Sundarbans, the world's largest continuous mangrove biotope consisting of nearly 100 islands shared between India and Bangladesh and encompassing an area of approximately 9,800 km^2, is a UNESCO World Heritage Site and RAMSAR site. These mangroves are strongly influenced by daily freshwater flow along with the diurnal tidal regime from coastal BoB. It is named after "*sundari*" (*Heritiera fomes*), the dominant mangrove species across the Sundarbans, and is home to rich biological diversity including tigers, Gangetic and Irrawaddy river dolphins, olive ridley turtles, and prehistoric mangrove horseshoe crabs, among others. Incidentally, this mangrove is home to numerous species of endangered, critically endangered, and near-threatened taxa.

More than 4 million people are directly dependent on its natural resources, particularly rich coastal fisheries that thrive in the estuarine waters of the Sundarbans mangrove. While many coastal communities continue to fish artisanally, mechanised practices of catching fish and other coastal bioresources have become frequent in and around the Sundarbans over the last two decades. In addition, as a result of climate change and other environmental changes, coastal bioresources are declining, leading to an intensification of fishing efforts. These transitions are leading to the introduction of cheap and destructive fishing practices, including fishing nets and gears that are resulting in increased bycatch. As a result, there are increasing reports of strandings of cetaceans such as Gangetic and Irrawaddy river dolphins, and Indo-Pacific finless porpoises, among others. The stranded fauna, many of which are protected as Schedule I species under the Wildlife Protection Act (1972), highlights the long-term challenges of marine biodiversity conservation this region faces.


Punyasloke Bhadury

Incidentally, the frequent occurrences of discarded ghost nets and fishing gear floating in the estuarine waters of the Sundarbans are resulting in the entanglement of marine organisms such as mangrove horseshoe crabs. However, reports of strandings and entanglements are infrequent. With the increased frequency of occurrence of macroplastics and nylon nets, among others, found floating in estuaries of the Sundarbans, the chances of marine fauna strandings are becoming severe. There is no coordinated long-term data collection on strandings of marine fauna from the coastal waters of the Sundarbans. In 2020, following the very severe cyclone '*Amphan*', more than 400 kgs of marine debris including ghost nets, fishing gear, and plastics were systematically removed over several months by members of the Integrative Taxonomy and Microbial Ecology Research Group (ITMERG) team. The removal exercise spanned an area of 10 km^2 near Sagar Island of the Sundarbans. During this intervention, many mangrove horseshoe crabs were found entangled in ghost nets which were eventually rescued and released. This intervention exercise was aided by coastal community members of Sagar Island, who continue to report on a regular basis to ITMERG on strandings and entanglements. The stranding incidents involving marine fauna are quietly changing coastal biodiversity patterns and ecosystem attributes with unknown ecological consequences for Sundarbans mangrove as well as for the wider Bay of Bengal. The infrequent reports of marine fauna strandings, ironically many of which are climate sentinel species, will lead to negative feedback on the livelihood of coastal communities. A coordinated marine fauna stranding programme focusing on the Sundarbans needs to be urgently initiated as a national priority and can help shape effective conservation action measures involving the coastal communities of the Sundarbans.

PHOTOSTORY

Dolphins and whales of the Bay of Bengal

Sumer Rao and Muralidharan M

In the days leading up to our first pelagic survey, we often found ourselves indulging in conversation about some of the cetaceans we hoped to encounter. Would we see the characteristic humps of Indian Ocean humpback dolphins breaking through the surface as we navigated out of the Visakhapatnam harbour? Or curious bottlenose dolphins as we made our way offshore? Perhaps some Stenellas and their famed acrobatics once we were closer to the shelf break?

But the Bay of Bengal had its own story to tell. Nothing could have prepared us for the sheer abundance of cetaceans or the remarkable interactions that we were fortunate to be privy to.

Over the past year, WWF-India's marine conservation programme has undertaken two week-long pelagic surveys off the coast of Andhra Pradesh. We covered a total of 1,400 kilometres at an average distance of 60 kilometres (~32 nautical miles) offshore. During this time, we recorded over 700 cetaceans across six different species. Spinner dolphins were the most numerous by individual count. Risso's dolphins were the most frequently sighted, with 11 pods ranging from 5 to 20 animals. The most thrilling encounter was a pair of Kogias, spotted nearly 100 kilometres offshore. Observing these cetaceans in their oceanic habitat was a privilege and an experience that will remain etched in our minds for a long time to come. Here, we will touch upon the species we encountered along with brief descriptions of our interactions with them.

Spinner dolphins (*Stenella longirostris*)

One of the highlights from the first survey was a pod of spinner dolphins that was 200 individuals strong. Over the 30 minutes spent with this pod, we observed almost every cetacean surfacing behaviour – from breaching, to porpoising, to lobtailing, and oh-so-much bow riding. In stark contrast, the pod we came across during the second survey looked like they meant business. The surface waters churned as a large school of tuna pursued a ball of baitfish. When we got closer, we saw the dorsal fins of spinners surging powerfully through the chaotic black water. Unlike the previous pod, which was playful and eager to interact, these dolphins were driven by a singular purpose: food. The occasional breach aside, the dolphins didn't so much as bat an eyelid in our direction.

Species counts: 350 individuals across 3 pods.

Risso's dolphins *(Grampus griseus)*

Something that stood out for us was the prevalence and varying extent of injuries sustained on the dorsal fins of the already scarred Risso's. From clean cuts and jagged wounds, to notching and cookie cutter injuries, the Risso's had them all. We also observed a mother with a young calf that was likely just a couple of weeks old.

Species counts: 140 individuals across 11 pods.

Pantropical spotted dolphins (*Stenella attenuata*)

Pantropical dolphins were second to Risso's in terms of the total number of pods we encountered. We observed an individual playing with a piece of plastic, which initially gave us quite a scare. However, it released the plastic mesh shortly after. We were also approached by a pod at night and watched them breach dramatically under torchlight. Two pods of pan-tropical dolphins were also seen interacting with larger pods of spinners, travelling in both cases.

Species counts: 120 individuals across 9 pods.

Pygmy sperm whales *(Kogia sp.)*

During the surveys, we had grown accustomed to encountering cetaceans near fishing vessels. One evening, as we approached an active long-liner, we noticed two cetaceans lying motionless on the surface. The placement of their dorsal fins – set far back along their bodies – had us guessing at first, possibly false killer whales? As we watched, these animals glided along. They breached listlessly, once, then again, before slipping into the depths. We stopped the vessel and waited, scanning the surroundings for a sign of surfacing. There was none. What were these animals, which are notoriously boat-shy, doing around a long liner? Were they interacting with the vessel or gear, or was their presence there simply a coincidence?

Species counts: 2 individuals belonging to a single group.

Bottlenose dolphins (*Tursiops truncatus*)

We had expected to come across more of these familiar cetaceans than we actually did. The two groups that we did encounter consisted of two individuals, and in both cases were travelling with larger groups of short-finned pilot whales. The first pair of bottlenose dolphins spared a minute to frolic in front of our vessel before continuing along their trajectory.

Species counts: 4 individuals.

Short-finned pilot whales (*Globicephala macrorhynchus)*

The largest and most endearing of the cetaceans we encountered, the pilot whales were curious and spent time with our vessel, eventually proceeding to pilot us forward. We recorded a single calf that was likely a couple of months old.

Species counts: 40 individuals and 3 pods.

The team took in one last sunset and were treated to a special pasta-based payasam prepared by the crew as we veer inland towards the Chennai harbour.

FROM THE GALLEYS

Across Indian Shores: Spotted and Stranded

In India, sightings and strandings of cetaceans offer fascinating glimpses into obscure marine mammals. In spite of challenges ranging from accurate identification to specimen condition during strandings, reports of these observations yield critical insights into species distribution, ecology, and health. In this section, we summarise recent findings that highlight diverse marine mammal encounters.

Dr. Chandrasekar and Dr. S. Kumar[1] reported a notable incident of a pregnant dwarf sperm whale (*Kogia sima*) stranded in 2021 in Palk Bay. The cause was unknown, although, given that the animal was otherwise unhealthy, and weather conditions were good, net entanglement was a distinct possibility. The presence of pregnant whales indicates breeding grounds in Indian waters, making these populations particularly vulnerable to entanglement in high-fishing-intensity seascapes.

While strandings may paint bleak pictures, they provide researchers with rare opportunities to thoroughly investigate morphology, condition, and genetics. For instance, two groups each used molecular tools to investigate stranded rorquals on the east and west coasts respectively. In West Bengal, Dr. Balakrishnan[2] and his team collected evidence from the second known stranding of the blue whale (*Balaenoptera musculus*) in the area since 1934. Using a fresh tissue sample, they presented a DNA barcode for the species, expanding on our fundamental understanding of the largest animal ever to inhabit the planet. In Kerala, Dr. Kundu[3] and his associates collected samples from another stranded rorqual, sequencing genomic DNA to accurately identify the individual as yet another blue whale. Without these analyses, whales can be particularly challenging to identify, depending on the state of the carcass.

A large part of a marine mammalogist's task is reporting on dead and decaying animals, so it is always a pleasure to report on new sightings. Normally restricted to coastal seas, the 'Vulnerable' Indo-Pacific Humpback Dolphin (*Sousa chinensis*) was reported in Gujarat at the estuarine river mouth of the Narmada River. Three individuals were sighted thanks to long-term monitoring efforts by the GEER Foundation[4]. This report adds to the range and distribution information for this species while expanding our understanding of the habitats it can live in.

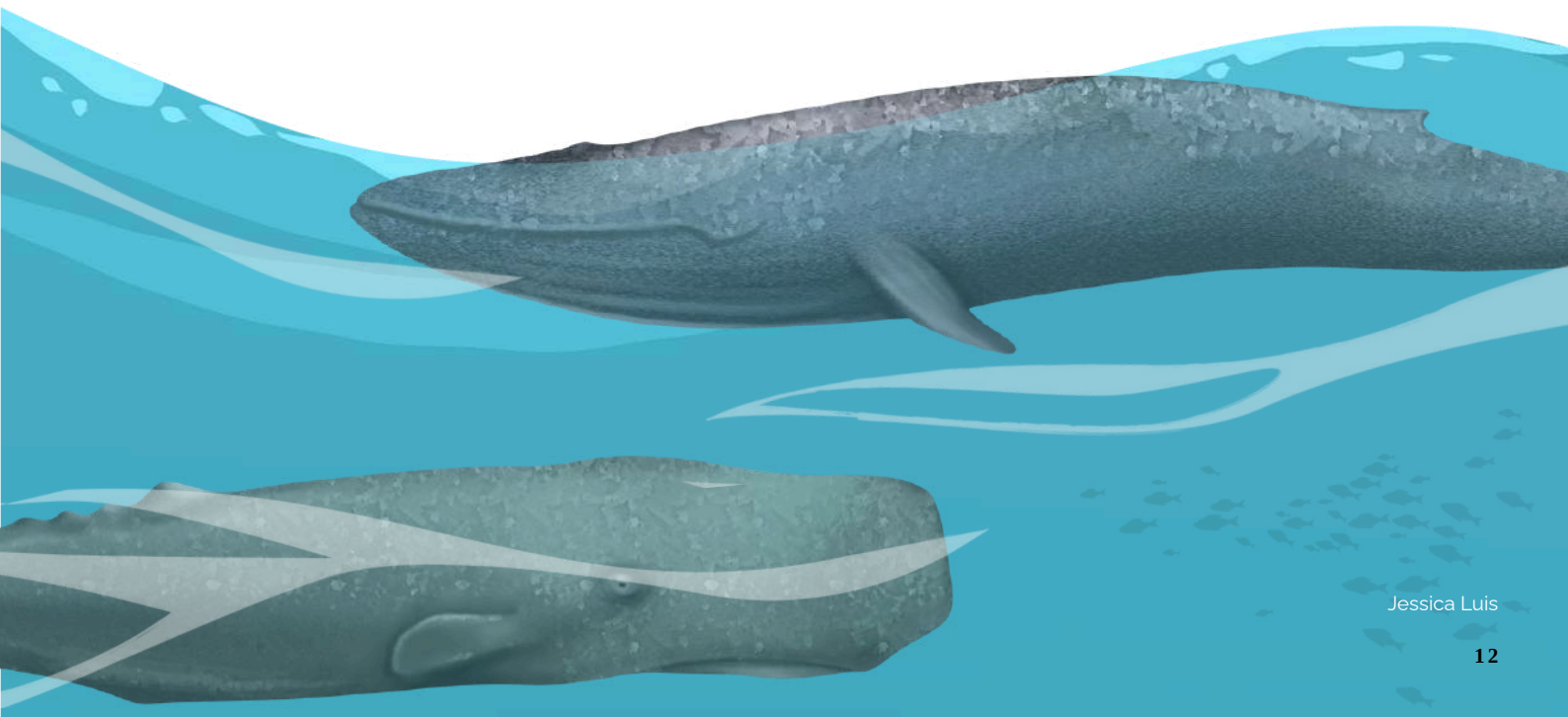
Given how elusive marine mammals are, these sightings and strandings are a critical resource in understanding how species use our coastlines and are vital to informing conservation efforts along our coastlines. Keep them coming!

Surviving troubled times: the Irrawaddy dolphins at Chilika

Chilika Lagoon, known for its unique brackish water ecosystem, forms a critical habitat for the highly endangered Irrawaddy dolphin (*Oracella brevirostris*). This vital wetland, designated as a Ramsar site, balances salinity through the inflow of seawater from the Bay of Bengal and freshwater from the Mahanadi River driving the distribution and abundance of aquatic life. This extensive review by Dr. Acharyya and his team[5] summarises the impact of natural and human activities on the small population of 110-160 dolphins in the lagoon.

Using the HIPPOC framework, the authors detail how habitat loss, invasive species, population growth, pollution, overharvesting, and climate change jeopardise the species. Habitat degradation, such as shoreline changes and siltation from increased deforestation and dam construction, alters the lagoon's delicate salinity balance, increasing stress on the dolphins. Pollution from agricultural runoff, aquaculture, and plastic waste exacerbates the dolphins' vulnerability to diseases and infections. Additionally, fishing-related threats like gear entanglement and vessel accidents further endanger the Irrawaddy dolphins by reducing prey availability.

As a way forward, the authors propose habitat protection, vessel traffic management, sustainable fisheries, research, community engagement, legislation enforcement, responsible tourism, and climate change mitigation. The paper calls for urgent concerted conservation efforts to save this fascinating population from extinction.



Jessica Luis

Seagrasses post-tsunami in the Andaman and Nicobar Islands

The 2004 tsunami did not just rock the Andaman and Nicobar Islands (ANI) - it turned the already vulnerable region like a colossal see-saw. With northern regions rising and southern regions sinking, the tsunami reshaped the seagrass meadows' species richness, composition, and coverage across the archipelago. Dr. Gole[6] and team explored how latitude influences seagrass recovery across five distinct island groups—North & Middle Andaman, Ritchie's Archipelago, South Andaman, Little Andaman, and the Nicobar Archipelago. The study revealed that six out of 11 seagrass species, including *Halophila ovalis*, *Halophila beccarii*, *Halophila minor*, *Halodule pinifolia*, *Thalassia hemprichii*, and *Cymodocea rotundata*, dominated these meadows. A treasure among these findings was the diminutive *Halophila decipiens*, which they report at a remarkable depth of 21m in Ritchie's Archipelago, much deeper than most earlier studies had reported this species in the Andamans.

Though Ritchie's Archipelago and Nicobar both boast high species richness, the former surprisingly has the lowest seagrass cover compared to Nicobar's typically lush expanse. The study also noted a decline in species richness from North to Little Andaman, emphasising latitudinal drivers.

Overall, the recolonisation of disturbed areas by early successional and historical species signals a hopeful recovery of seagrass populations in the ANI. The authors concluded that while latitude may not be the sole factor, it significantly shapes ecological gradients like water depth, topography, habitat heterogeneity, and nutrient dynamics. They advocate for further research to unravel these complex interactions, underscoring that ecological resilience may vary geographically in the Andaman and Nicobar Islands.

Piloting Marine Spatial Planning at the Lakshadweep Islands

In the wake of booming tourism in the Lakshadweep Islands, marine spatial planning (MSP) has emerged as a linchpin for sustainable development and ecosystem-based management of the blue economy. Celebrated for its breathtaking lagoons and shimmering turquoise waters, this archipelago is an iconic hotspot of marine diversity —vibrant coral atolls, lush seagrass beds, sea turtle gatherings, and an array of marine megafauna. With Lakshadweep's economy heavily reliant on tuna fishing, bait-fish management, and seaweed cultivation, sustainable fisheries practices are essential to its resilience.

Dr. Ramana Murthy[7] and his team discuss the India-Norway International Ocean Management and Research Initiative (2019), using the Lakshadweep Islands as a pilot for MSP. This initiative blends economic growth with environmental stewardship through zoning, conflict resolution, and the promotion of sustainable practices. The study underscores the importance of integrating land and marine planning, identifying marine economic clusters, and conserving biodiversity hotspots. Through comprehensive datasets and stakeholder engagement, it charts a course for effective marine resource management.

Moreover, the authors highlight the innovative SAHAV (a web GIS-based dashboard, combining 'SAgar' (Indian) and 'HAV' (ocean in Norwegian) portal, a platform that allows proposal submissions to help administrators make informed decisions, maintaining that the iterative nature of MSPs ensures continuous refinement of management plans, balancing economic aspirations with the need to conserve fragile ecosystems.


Karan Deshpande

Imperilled Platanista

A slew of recent papers focus on the circumstances jeopardising India's sole pair of obligate freshwater cetacean species. Gill Braulik and her collaborators[8] review the status of the endangered Indus River dolphin (Platanista minor). Around 40 individuals were described over the past two decades, constituting an isolated population within the tract of the Beas River above the Harike Barrage. Separated from the other population in Pakistan by several hundreds of kilometres, these dolphins are at risk from accidents involving fisheries, water pollutants, venturing downstream of the barrage where suitable habitat does not exist, and overarchingly – alterations to the river flow and hydrology. The authors make an urgent call for management strategies that directly address these threats, coupled with monitoring dolphin movement, heightened community engagement, and potential translocations from healthier populations.

Five papers published between August 2023 and April 2024 review similar circumstances faced by the congeneric Gangetic River dolphin (Platanista gangetica). The first study[9], by doctoral candidate Ruchika Sah and her co-authors, reports on the presence of several Potentially Toxic Elements (PTEs) within lower trophic rungs across three rivers within the dolphin's habitat. While the Risk Quotient (RQ), the ratio of predicted environmental concentration to predicted no-effect concentration, was unalarming in contaminated prey, the Reference Dose-based RQs (the maximum 'safe' levels of toxins) of all but two PTEs indicated substantial risks to the species. This study highlights the importance of monitoring and addressing pollution levels, potentially arising from sources like agriculture, vehicular emissions, and metal-based plastics.

In another piece of research[10], Gaurav Sonkar - also a doctoral student - used hydrodynamic modelling to assess the habitat suitability of a tract of the Ganga, upstream of the Narora Barrage. Combining factors like water flow, riverbed bathymetry, and geological slope, the models describe patchy habitat availability within the lean flow periods. Both these papers indicate significant challenges posed by habitat degradation to the persistence of India's national aquatic animal.

In a similar vein[11], PhD student Goura Das and his collaborators assessed the distribution of this species within the Gangetic basin . Their findings indicate that the dolphin is present in most of the basin, its presence determined to a large degree by channel depth, riverine meanders, confluences, and water discharge.

Finally, Dr. Singh and his associates describe their on-ground conservation efforts to rescue trapped dolphins over nearly a decade[12]. While five individuals unfortunately perished during rescue and transport, 19 of 24 individuals were safely rescued and relocated. Such concerted efforts are essential to build on the growing body of evidence highlighting the condition of this endangered mammal. The last review[13], by Dr. Nayak and Iburahim S., further drives this point home by assessing past research on P. gangetica and describing current needs. Their work found that most research focussed solely on ecology, largely ignoring fundamental biology and genetics. The review strikes a cautionary note, stressing the need to conflate aspirational development goals within these densely human-populated plains with passive restoration activities focusing on habitat improvement. Finally, they emphasise the benefits of collaborative efforts by several agencies and groups actively working to bring this charismatic animal back from the brink of extinction.

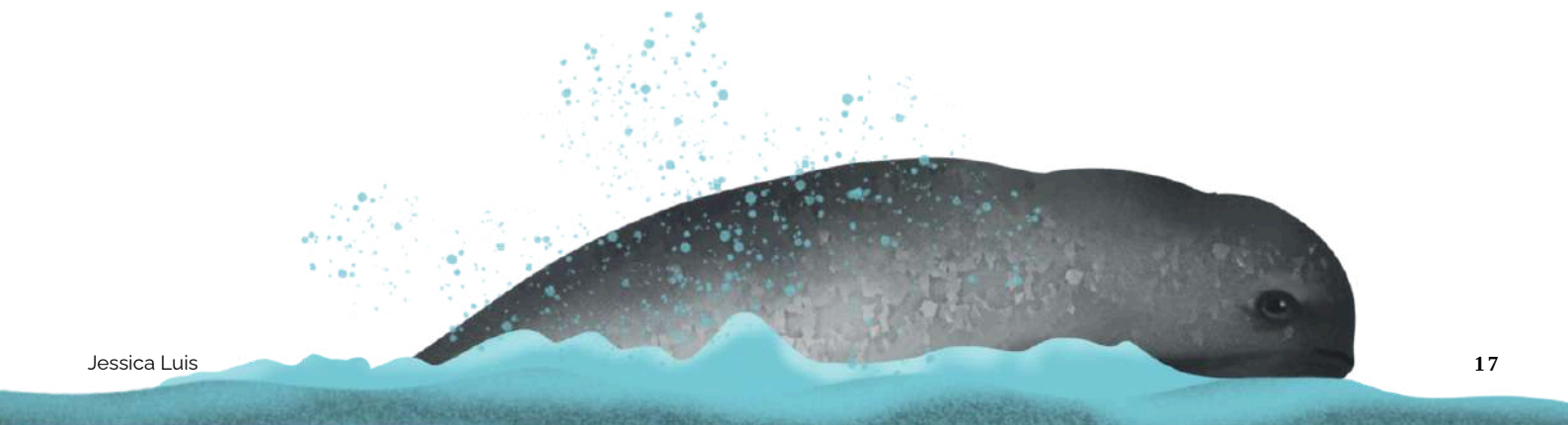
Skulls of Cetaceans Past

Different cetacean families evolved over a small handful of incidents from land mammals millions of years ago, giving rise to the approximately 90 extant species described today. A species that once inhabited the ancient Tethys Sea between Gondwana and Angara over 34 million years ago, *Remingtonocetus harudiensis* has been described from a few fossils discovered over the Indian subcontinent. Most recently, Chakraborty and Sengupta unearthed the largest known skull of this species from the Harudi Formation[14]. This shale and limestone deposit at Kutch, Gujarat, was incidentally where the first specimen of the species was also found and described.

This discovery, being the largest to date, broadens our understanding of the prehistoric species, suggesting a wider range in body size than previously known. While portions of the skull are lost to time and geological processes, it remains among the most complete fossils encountered thus far. This finding, along with others in the area, marks this region in the Indo-Pakistan area as vital in the historic evolution of cetaceans.

Protecting dugong habitats can help India achieve 30x30 target

Dugongs reside as disjunct populations in the western Indian Ocean. Sohom Seal and co-authors used species distribution modelling to demarcate dugong habitats along the Indian coastline with varying risk profiles[15]. They found seagrass presence to be the primary factor in determining dugong habitat suitability across the study sites. Remarkably, the entire Palk Bay-Gulf of Mannar region was observed to be at high to moderate risk with more than 85% high-risk areas outside of the Marine Protected Area network. The authors identified ‘Critical Dugong Habitats’ and recommended systematic conservation planning in these areas to add to Indian efforts towards achieving the 30 x 30 global biodiversity target.



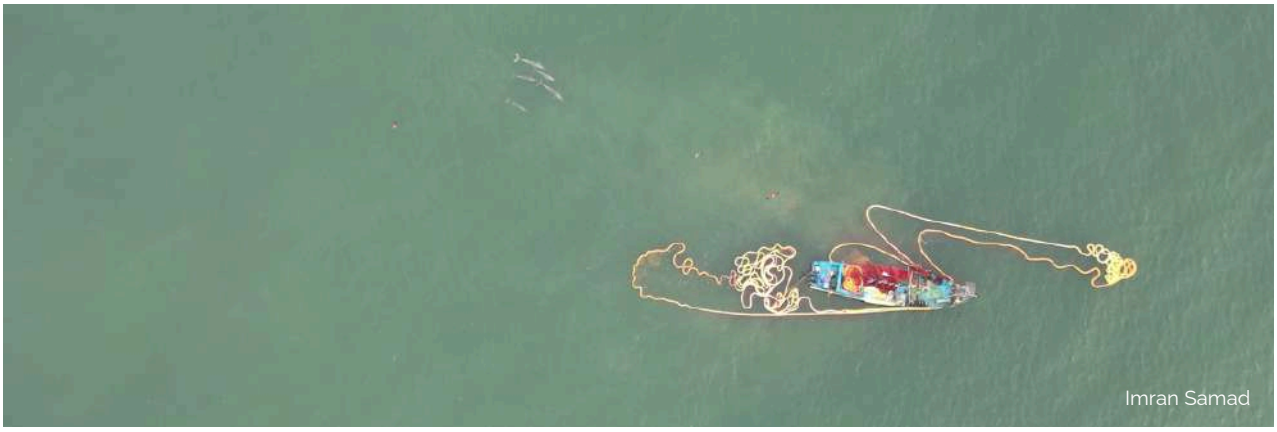
Jessica Luis

IN THE FIELD

Imran Samad

"God has given us the entire sea so we never go hungry, but he has also put devils to stop us from being too greedy." The growing monotony of everyday questionnaires was quickly shattered by these words of a middle-aged fisher who I interviewed to record their fishing effort. I glanced up from my notebook as he continued "*We get plenty of fish when we dip our nets in, but often the devil's agents ensure we pay for what we take; pufferfish gnaw on our net and our fishes the longer we keep it dipped; dolphins come in large numbers and rip off our catches, damaging our nets; sting rays cause excruciating pain if not handled carefully, and sea snakes can kill you with a bite. Everything comes at a price!*"

Often as researchers, we are too invested in specific questions to remember the larger picture, and spending time with locals rescues me from being trapped in this academic thought bubble. Conversations are unplanned and can range from something as bizarre as 'COVID-19 was a hoax spread by the government to stay in power' to how dolphins once used to cooperatively fish with their elders. Segregating fact from fiction is a skill you learn over time, and some statements are worth querying. Fishers on the West Coast have a troubled relationship with dolphins, blaming them for stealing catches. Several studies from throughout the world report dolphins foraging close to fishing vessels, which makes sense from an ecological perspective as well. Specifically, the Optimal Foraging Theory predicts that since fishing nets are an efficient source of food for dolphins their interactions should be common as dolphins should capitalise on easy gains. But co-occurrence doesn't always mean dolphins are interacting with fishers - are dolphins feeding nearby or off fisher nets all the time? Unsurprisingly enough, the answer is more complicated than we think.



I use drones to observe how and when Indian Ocean humpback dolphins interact with fishing nets in Goa. Of the many days I have seen dolphins co-occur with, and even forage near fishing vessels, not many have resulted in direct interactions, with dolphins generally staying away from the net. When dolphins engage with the purse seine and gillnets, they do so for long times coordinating their dives and movements. Juveniles are seen turning towards one another occasionally, likely communicating with each other. Similarly, mother-calf pairs are seen with each calf carefully following its mother, presumably being taught to forage from the net. Understanding the specifics of dolphin-fisheries interactions will require spending much more time analysing my large video datasets but crudely it seems that theory-based predictions may not follow. This gives me more time to sail beyond academic borders and think of unorthodox reasons for these interactions before data comes in to unequivocally reject my beloved hypotheses.

The Optimal Foraging Theory reduces the identity of every dolphin into a rigid entity, optimised only to gather food for its daily whereabouts. Of course, there are many more factors to consider, along with the fact that there is no relaxation in the theory to incorporate individuality - allowing dolphins to actively ‘think’ how and when they should interact with fishing nets. Dolphins are highly cognisant animals, but that shouldn’t refute patterns in how juveniles vs adults, or females vs males interact with fishing nets. It only decrees these patterns may be much more variable, and driven by individual learning, life history, and perhaps active decision-making.

Naturally, as I hear what fishers think of dolphins, I wonder what – and if ever – dolphins think of fishers. What a wild animal thinks is a question of philosophy and so we as ecologists generally steer clear of such inquiries. Yet, observing dolphin behaviours and noting deviations from what theory predicts underscores the importance of incorporating individual thinking and perhaps personalities into our preconceived models of animal behaviour to better understand all the wonderful things that animals are doing around us.

ARTICLE IN-FOCUS

Risks associated with the spatial overlap between humpback dolphins and fisheries in Sindhudurg, Maharashtra, India

Ketki Jog

Our study delves into the intriguing yet worrisome relationship between humpback dolphins and fisheries along the Sindhudurg coast of Maharashtra, India. Conducted from 2012 to 2015, our research aimed to explore how these intelligent marine mammals and human fishing activities intersect, often in ways that pose risks to both dolphins and the fishermen who depend on these waters.

We observed dolphin groups in their natural habitat using line transect surveys, which involved systematically travelling set paths along the coast by boat. This allowed us to record dolphin behaviours and group sizes. But our focus wasn't solely on the dolphins; we closely monitored the fishing vessels operating in the same areas, including gillnetters, trawlers, purse seiners, and shore seiners. We also mapped the spatial overlap between humpback dolphins and fishing vessels using observations from our surveys. By dividing the survey area into 42 equally sized cells, we calculated dolphin and fishing vessel densities and then mapped areas of high, moderate, and low risk based on where dolphins and different types of fishing vessels were most likely to intersect. What emerged was a complex pattern of coexistence, with dolphins frequently foraging near active fishing boats, especially in high-risk areas near estuaries and within 500 meters of the shoreline.

Indian Ocean humpback dolphin (*Sousa plumbea*) mother-calf pair

Indian Ocean humpback dolphin approaching an active gillnet operation.

A particularly intriguing discovery was that dolphins were most often seen foraging when fishing vessels were nearby, and their groups tended to be larger in such situations. This suggests that the dolphins might be attracted to the fishing activity, possibly viewing it as an easy source of food. However, this proximity isn't without its dangers—chief among them being the risk of dolphins getting entangled in fishing nets. Gillnet vessels posed the greatest threat due to their significant overlap with dolphin habitats.

To make sense of these interactions, we used statistical models to analyse the data. We found that the presence of fishing vessels, particularly those actively fishing, had a clear impact on dolphin behaviour. Yet, our study had limitations. We could only cover a limited area, and our observations were confined to daylight hours and fair weather, which means parts of the dolphins' and fishermen's activities went unrecorded.

Given these findings, we advocate for enhanced marine mammal conservation and sustainable fishery management practices along our coastline. One key recommendation is the implementation of spatial management strategies, such as monitoring fishing activity, particularly in dolphin habitats. These measures could reduce the risks for dolphins while also safeguarding the economic interests of local fishing communities.

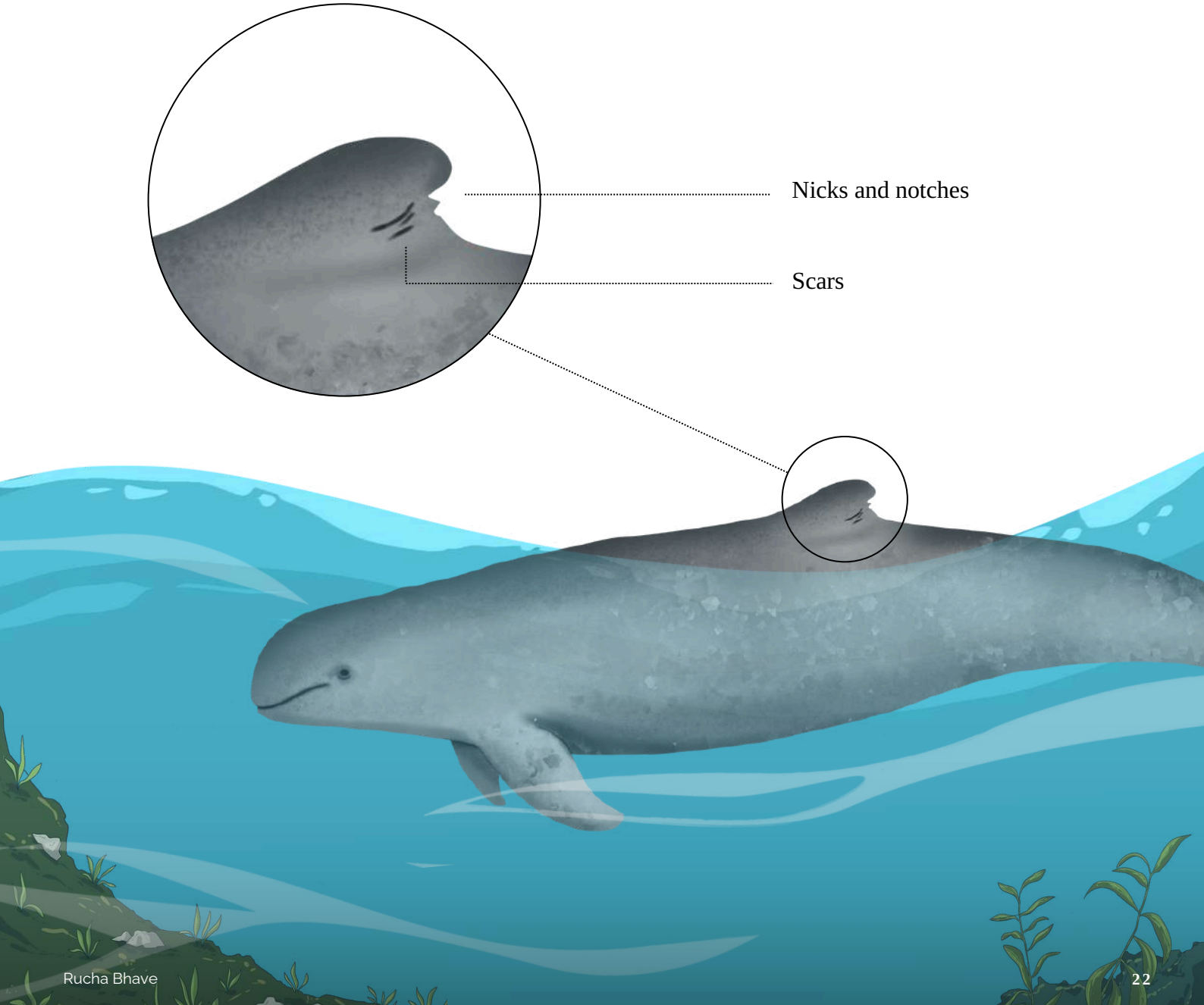
In essence, our work highlights the delicate balance between conserving humpback dolphins and sustaining fisheries along the Sindhudurg coast. Our findings lay the groundwork for developing strategies that can protect these remarkable creatures while ensuring that local fisherfolk can continue to earn a living from the sea. It's a classic challenge of finding a win-win solution in a situation where both nature and human livelihoods are intricately connected.

FIN MATCHING

Using Mark-Recapture methods to study Irrawaddy Dolphins in Chilika Lagoon

Photo-identification is a key method researchers use to identify individual animals, study their movement patterns and estimate population parameters. Dr. Dipani Sutaria's research[17] explored both the ecological and social dimensions of dolphin conservation in Chilika Lagoon, a UNESCO Ramsar site. Her study identified around 80 individual Irrawaddy dolphins using photo identification.

Every dolphin has a unique dorsal fin bearing scars, nicks and notches.
These marks occur naturally and are like a fingerprint, used to identify an individual.



Rucha Bhave

Activity

In this activity, you'll identify individual dolphins based on visible nicks, notches, and scars on their fins, using Sutaria's ID catalogue. How many individuals can you sight here? Can you say which ones were sighted more than once?

A. How many individuals can you identify? _____

B. How many individuals have been sighted more than once? _____

Answers: A- 6 individuals, B- 3 individuals (4,10) (2,3,8) (6,9)

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