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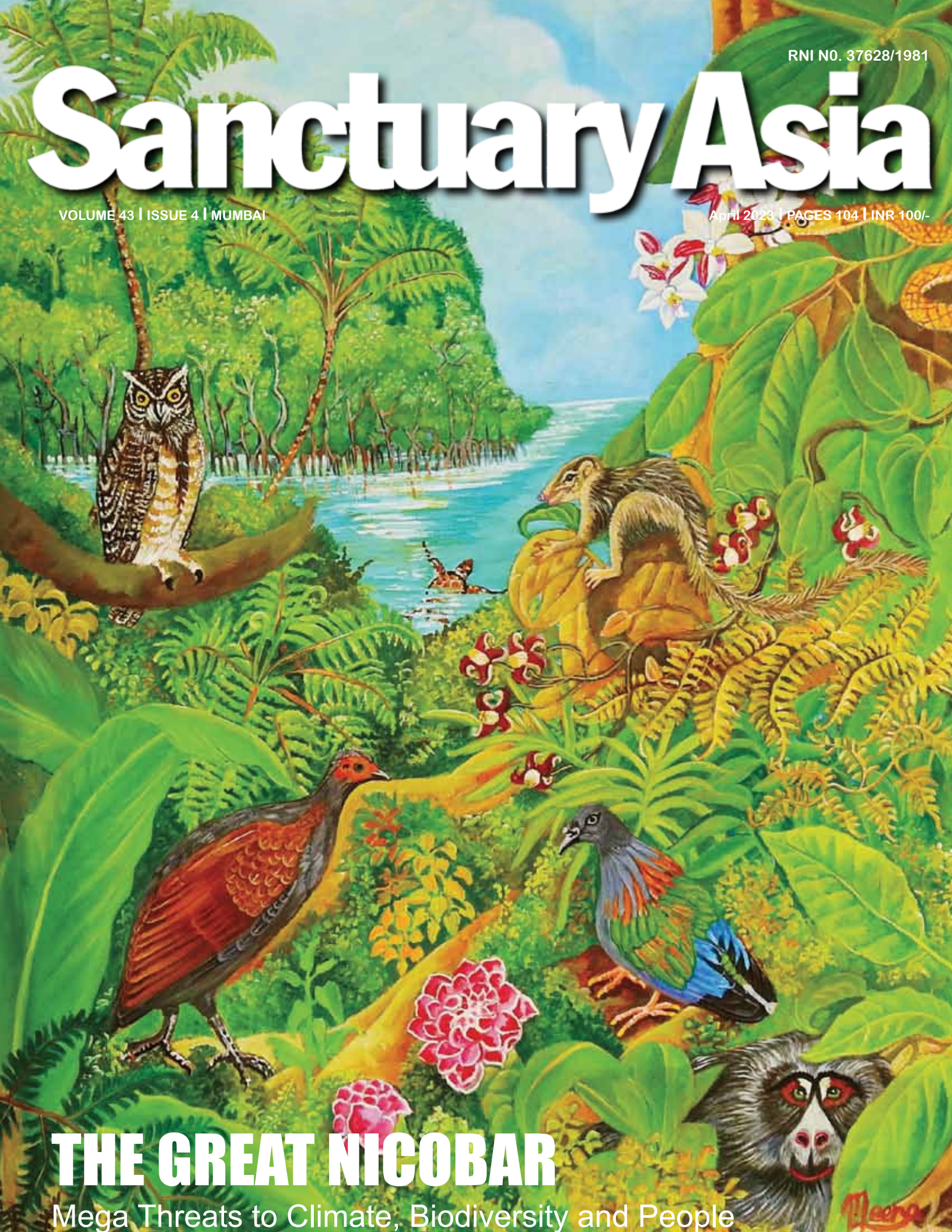


THE GREAT NICOBAR

Mega Threats to Climate, Biodiversity and People

Photo Credit: Dr. Anish Andheria

FOREVER STRIPES

The survival of the tiger and all the creatures that share its habitat, including leopards, wild dogs, elephants, rhinos and uncounted plants, insects, birds and reptiles, depends on whether humans can set aside vast undisturbed wildernesses for nature.

The wildlife conservation movement needs the support of us all. For more information on how you can help, or to pledge your support for those who work round-the-clock to protect our wildlife, write to Dr. Anish Andheria (President, Wildlife Conservation Trust) at anish@wctindia.org or visit www.wildlifeconservationtrust.org

#DOGOODBEGOOD

DSP
MUTUAL FUND

He has been researching and writing on issues of the Andaman and Nicobar Islands for over two decades. He is also the author of five books on the islands and has written several articles published widely, including in Sanctuary Asia.

An alumnus of the Madurai Kamraj University, her committed research on the endemic Nicobar flying fox resulted in The Project Action Tayam-Peh (ecological survey of the Nicobar Islands), an initiative involving Indigenous communities in conservation.

Born and raised in North Andaman, he has a Bachelor's degree in Business Administration and is currently pursuing a Masters in Disaster Management. He moved to Great Nicobar Island in 2018, and enjoys documenting the flora and fauna of the island.

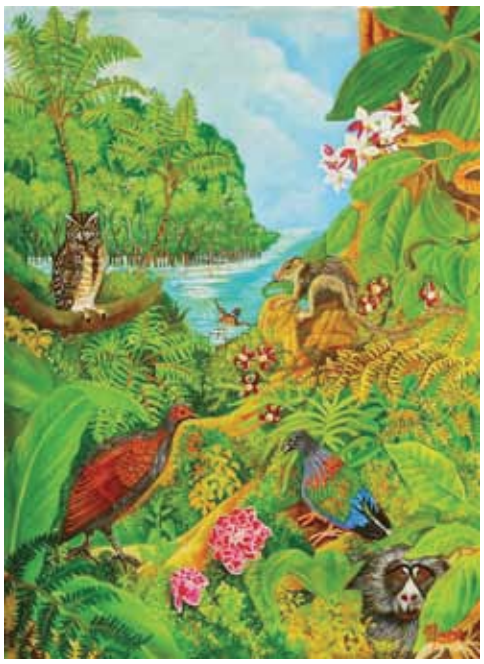
A marine ecologist interested in understanding ecological drivers of marine populations, she is currently investigating the impact of changing climatology on marine communities in the Arabian Sea.

Sanctuary Asia April 2023

CONTENTS

On the cover

Meena Subramaniam's vibrant cover illustration (also see page 39) is a defiant celebration of the immense, uncapturable beauty and diversity of life on Great Nicobar Island. In this stylised scene, creepers twist and lianas tumble into endemic plants, keeping company with the Nicobar treeshrew, the Nicobar Megapode and other irreplaceable species that a hastily approved, foolishly conceptualised mega-infrastructure project is all set to soon obliterate.



Artist: Meena Subramaniam

24 Cover Story

The Story of Great Nicobar's Misadventure **Pankaj Sekhsaria** has been researching and writing about the Andaman and Nicobar Islands for over two decades. For our cover story, he fleshes out in meticulous detail the unscientific way in which these biodiverse islands have been auctioned off to build an expensive, transhipment port that will destroy lakhs of trees and disrupt unique ecosystems in a seismically active zone. The writer provides a comprehensive timeline of events that constitute Great Nicobar's planned destruction.

NEWS

PHOTOFEATURE

PEOPLE

IN THE FIELD

the southern part of the Nicobar archipelago, are home to endemic species, which thrive in the secrecy of dark forests, protected so far by the absence of modern civilisation. Researcher and herpetologist **S. Harikrishnan** writes of the varied herpetofauna – including a long lost skink – that we stand to lose if their ecosystems are degraded, or worse.

SPECIES FOCUS

BIRDING

NATURAL HISTORY

CONSERVATION ACTION

PROJECTS

PHYTOFOCUS

CAMPAIGN

REVIEWS

YOU SPEAK

LAST WORD

Why on Earth?

Say this word aloud, because our life depends on it!

Biosphere: noun, pronounced /ˈbʌɪəsfɪə/

Your life depends on it. The word describes "the regions of the surface and atmosphere of the Earth, or another planet occupied by living organisms".

Say this word aloud too!

Homeostasis: noun, pronounced /ˌhəʊmɪə(ʊ)ˈsteɪsɪs, ˌhɒmɪə(ʊ)ˈsteɪsɪs/

It's a vital word that describes "the tendency towards a relatively stable equilibrium between interdependent elements, especially as maintained by physiological processes".

As we do with every breath… humans take the magic of reality for granted. We cannot wrap our heads around the fact that every river, ocean, lake, wetland, grassland, forest and desert, plus the plants and animals residing therein, dance to the tune of our self-repairing biosphere. Forget dancing, humans are the only species capable of and senseless enough to actually declare a losing war on the biosphere! Clearly, humility is not our strong suit, though survival just might be. Young voices are cracking the concrete ceilings above them, where their elders sit in war rooms as they conspire to dismantle the biosphere. Wade through those two words again – biosphere and homeostasis. They offer a relatively quick, economical and proven path out of the self-generated morass into which human beings are plunging. The words describe nature's way of restoring equilibrium to life on Earth.

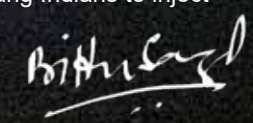
It's this equilibrium that humans – the ignorant, arrogant, avaricious and apathetic ones – are needlessly (and irrationally) shaking.

And what a shake, my countrymen!

The Bhopal Gas Tragedy in 1984 killed an estimated 4,000 people. Mercury dumping in Kodaikanal by Unilever poisoned the once pure Kodai lake forever. Mumbai's 2005 Mithi flood killed almost 1,000 innocents. The 2019 Kerala flood possibly killed over 500 people. How many more lives must be lost to risky development plans before India agrees that too many lives have been lost?

And the juggernaut trundles on. The ongoing Joshimath tragedy is poised to be replicated across wider swatches of the Himalaya. Folly after ecological folly suggests that India's planners are not open to self-correction, even when forewarned. Future disasters at the hands of poor planet management stare us in the face. Instead of investing in protecting our country from known climate risks, we are going in for ambitious gambles such as the Great Nicobar Project, the Ken-Betwa River Linking Project and Mumbai's Coastal Road Project... some planned, some in various stages of implementation.

I routinely speak to hundreds of young Indians to inject hope into their hearts, using the words homeostasis and self-repairing biosphere. They listen. They believe. Then ask with innocence and incredulity: "When they know, why on Earth are our elders doing this?"



Bittu Sahgal,
Editor, Sanctuary Asia

PHOTOGRAPHER: Gobind Sagar Bhardwaj
LOCATION: Galathea Bay, Great Nicobar
DETAILS: Camera: Canon 6D Mark II, Lens: Canon Tokina 11-16, Aperture: F/3.5, Shutter speed: 30 sec., ISO: 6400, Focal length: 15 mm.
DATE: February 12, 2023, 1:44 a.m.

WORLD SCAN

U.S. APPROVES CONTROVERSIAL OIL DRILLING PROJECT IN ALASKA

The Willow project, led by the multinational corporation ConocoPhillips, is a proposal to drill oil and gas from Alaska's National Petroleum Reserve – land owned by the U.S. federal government that spans approximately 93,000 sq. km. The plan, long opposed by environmentalists and Native residents, was previously approved in its entirety by the Trump administration. The Biden administration recently sanctioned a part of it. In doing so, President Biden broke one of his own campaign vows that there would be "no drilling, period" on federal lands.

An NPR report mentioned that a government agency document, released in February, had described the Willow "project site as 'critical' to local wildlife, supporting 'thousands of migratory birds' and serving as 'a primary calving area for local caribou'." The project, generating 600 million barrels of oil over 30 years, would also create around 260 million tonnes of greenhouse gases. Environmentalists have pointed out that the recent decision goes against the Biden administration's pledge to tackle climate change.

PUBLIC DOMAIN/BOB WICK/BLM

The Willow project site is critical to local wildlife, as a nesting ground for thousands of migratory birds and primary calving area for local caribou.

SCIENTISTS WARN OF 'PHOSPHOGEDDON'

Phosphorus, a mineral widely used in fertilisers, is of vital importance to the global food system. Large amounts of it are naturally found in only three regions in the world. Scientists have recently warned that our overuse and misuse of the mineral may lead to a 'phosphogeddon'. If we continue using phosphorus at the current rate, we will hit a peak, after which many countries will struggle to acquire enough of it to feed their citizens. Another concern is that cartels may control the world's supplies, leading to soaring prices.

PUBLIC DOMAIN/F. LAMIOT

Excessive use of phosphorus leads to eutrophication, leading to algal blooms, which cause aquatic dead zones that threaten biodiversity as well as our food security.

An excess of phosphate fertiliser that washes into waterbodies is also leading to the growth of large algal blooms, which causes aquatic dead zones that threaten both biodiversity as well as our food security. When the algae die, its decay can lead to the production of methane – a greenhouse gas that warms the atmosphere much faster than carbon dioxide.

NATIONS SIGN HISTORIC 'HIGH SEAS TREATY' TO PROTECT MARINE LIFE

After a decade of negotiations, nearly 200 countries have signed a legally-binding treaty to turn 30 per cent of the world's seas into Protected Areas. This decision to increase efforts to protect marine life is historic – the last international agreement on ocean conservation was the UN Convention on the Law of the Sea, signed 40 years ago. Until now, about seven per cent of the world's oceans have received legal protection, with only around two per cent being well protected. The ocean represents 90 per cent of the world's biosphere, and marine life is critically threatened by anthropogenic climate change, overfishing and pollution. The treaty covers legal tools to set up and maintain Marine Protected Areas (MPAs); environmental assessments for determining potential damage caused by commercial activities such as deep-sea mining; and a pledge by signatories to share ocean resources.

VIETNAM JAILS WILDLIFE TRAFFICKER FOR 13 YEARS

A court in Vietnam has sentenced a wildlife parts smuggler to 13 years in prison for trafficking nearly 10 tonnes of rhino horns, elephant tusks, pangolin scales and lion bones from South Africa and Nigeria to Vietnam between 2021 and 2022. According to a 2021 report by NGO Education for Nature Vietnam (ENV), since 2018, over 60 tonnes of wild animal parts have been confiscated at major shipping ports in Vietnam, yet not one shipment owner had been arrested or taken to court. Bui Thi Ha, Vice Director of ENV said this was a "first step towards breaking the supply trade network of the wildlife trade" that sets a positive precedent for other Vietnamese authorities to follow. Vietnam is a major transport hub for trafficked wildlife. A 2021 report found that a mere 14 per cent of all wildlife seizures made in Vietnam in the past 10 years have led to convictions.

INDIA SCAN

ANOTHER LION SANCTUARY AS GIR NUMBERS SOAR

Gujarat is home to the world's last remaining wild population of the Asiatic lion *Panthera leo persica*, with a majority (around 400) found in the Gir National Park. In fact, Gir's lion population exceeds its carrying capacity and is so crowded (see *Sanctuary* Vol. XX No. 5, October 2000) that lions often venture into nearby villages in search of food and shelter. A 2013 Supreme Court ruling had ordered the state government to shift some of the lions to the Kuno Wildlife Sanctuary in the neighbouring state of Madhya Pradesh (see *Sanctuary* Vol. XXX No. 4, August 2010). However, the Gujarat government resisted this order, which led to criticism over them being possessive of the title of being the 'only home' of the Asiatic lion. Now, it is planning to move 40 lions to another Protected Area within Gujarat (where many lions had already moved of their own volition!). Disturbingly, Gir is believed to have lost as many as 240 lions over the past few years. Half of these were cubs, many of which were killed during infighting, some victims of cannibalism (a natural phenomenon). Such realities underscore the need to offer Asiatic lions more space in alternate homes to secure the future of the species in the wild.

MARCH SEES 71 FOREST FIRES IN GOA

For 10 days, commencing March 5, 2023, Goa has been tackling its most destructive spate of forest fires, with 71 conflagarations erupting across the state. Hundreds of government officials and citizens have been working ceaselessly to put the fires out and mitigate some of the devastation. The Ministry of Environment, Forests and Climate Change (MoEFCC) stated, however, that "no major damage to flora and fauna" had been observed, while conservationists and citizens on the ground have reportedly witnessed trees – hundreds of years old – burning, fallen nests, and charred wild species. Cashew plantations in the hills near the forests, also caught fire, affecting the livelihoods of farmers. Goa has been experiencing temperatures between five to seven degrees celsius above the normal range since February 2023. In 2020, the State Action Plan on Climate Change (SAPCC) had warned of Goa's increasing vulnerability to forest fires during the summer months, attributing the risk to our human-induced climate crisis. Pramod Sawant, Goa's Chief Minister readily agreed, saying that the forest fires were not accidental but 'man-made'. On March 21, on the International Day of Forests, the Amche Mollem citizen's environmental group in Goa ran a Twitter campaign 'Goa is Burning, Stop Double-Tracking' to raise awareness about forest fires and the fire risk associated with unchecked development.

SANGEETA DHANUKA/SANCTUARY PHOTOLIBRARY

The Gujarat government is planning to move 40 lions to another Protected Area within Gujarat, as Gir National Park has exceeded its carrying capacity.

RECORD ARRIBADA OF 6.37 LAKH OLIVE RIDLEYS AT RUSHIKULYA, ODISHA

Between late February and early March 2023, a record number olive ridley turtles arrived at the Rushikulya coast in Odisha's Ganjam district, for mass nesting. The previous record was 5.5 lakh. This surge in turtle numbers has been attributed to the formation of new beaches for laying eggs close to the Podampetta region, according to Sunny Khokkar, Berhampur Divisional Forest Officer. He added that the absence of extreme weather events this year also encouraged the smooth arrival of nesting turtles. The actual number of nesting turtles may be higher as more continue to arrive on the shores of Rushikulya. The Forest Department has sent more forest officials to safeguard the nests as a measure to reduce turtle mortality. That said, naturalists worry that apart from trawlers, drift nets and plastic pollution, available beach nesting sites for turtles across the world are steadily vanishing, thus threatening the already endangered marine reptiles.

INDIAN ENVIRONMENTAL DOCUMENTARIES AT THE OSCARS

The Elephant Whisperers, a film created by Kartiki Gonsalves and Guneet Monga, won the Best Documentary Short Film at the Academy Awards 2023, becoming the first film produced in India to win an Oscar. The film is about a duo from the *Kaatunayakan* tribe, Bomman and Bellie, and the bond they formed with an orphaned baby elephant entrusted to their care at the Mudumulai National Park in Tamil Nadu. The *Kaatunayakan* tribe have been protesting against human rights violations committed against them, demanding that their forest rights be recognised. In her acceptance speech, director Kartiki Gonsalves said, "I stand here today to speak of the sacred bond between us and our natural world, for the respect of indigenous communities and empathy toward other living beings we share space with, and finally, coexistence." Another Indian environmental documentary film *All That Breathes*, directed by Shaunak Sen, was also nominated for an Oscar in the Best Documentary Feature Film category, but did not win.

PUBLIC DOMAIN

CLIMATE WATCH

CHOLERA OUTBREAK IN SOUTHERN AFRICA LINKED TO EXTREME WEATHER

The World Health Organisation has attributed increased outbreaks of cholera in Mozambique and Madagascar to extreme weather events in southern Africa such as heavy rainfall, floods and cyclones – exacerbated by the climate crisis. Ten other countries have also reported a spike in outbreaks. Though there have been outbreaks in Mozambique before, the current wave of cholera spans a wider area and has a higher case fatality rate (CFR). Besides the extreme weather events, other factors that hasten the spread of waterborne diseases are poor monitoring, lack of access to drinking water, poor sanitation and hygiene practices, and a struggling healthcare system. In their report on Madagascar, Mozambique and Malawi, the World Weather Attribution initiative asked that measures to deal with the spread of such diseases in this era of accelerated climate change, be a key priority of governments.

IPCC RELEASES SYNTHESIS REPORT

The UN's Intergovernmental Panel on Climate Change (IPCC) published its Synthesis Report of the Sixth Assessment Report (AR6), an overview of the state of knowledge of the science of climate change. It includes a summary of the previous five reports and is also based on the three special reports on global warming of 1.5 °C, climate change and land and on the connections between the ocean and cryosphere. These reports have been compiled by 700 scientists in 91 countries, over eight years. Professor Joyashree Roy, one of the authors of the Synthesis Report reported that the scientists found that by 2030, there is a 50 per cent chance that global surface temperatures in any year could exceed 1.5 °C. If temperatures overshoot the 1.5 °C mark, there could be irreversible damage to life on Earth. The modelling demonstrates that while it is theoretically possible to limit warming to 1.5 °C, the present scale, scope and pace of action pledged until 2030 is insufficient to fulfill this goal.

PUBLIC DOMAIN

Scientists believe that by 2030, there is a 50 per cent chance that global surface temperatures in any year could exceed 1.5°C.

A NEW POLICY TO AID COMMUNITIES DISPLACED BY EROSION

The National Disaster Management Authority (NDMA) is developing India's first policy to rehabilitate and provide support to communities displaced as a result of river and coastal erosion. Until now, most policies in India have focused on displacement after sudden rapid-onset disasters such as floods and cyclones.
Over the last two years, NDMA consulted with central ministries, state government departments, as well as NGOs. They spoke to 24 focus groups and surveyed around 600 households in coastal and riverine districts of Kerala, Tamil Nadu, Andhra Pradesh, Odisha, Assam, West Bengal, Bihar and Uttar Pradesh. The directive to draft a policy was based on the 15th Finance Commission's report for 2023, which covers two aspects related to the new policy. First, it introduces mitigation measures to prevent erosion under the National Disaster Mitigation Fund (NDMF), allocating Rs. 1,500 crore for 2021-26. Second, for the resettlement of people displaced by erosion, it sets aside Rs. 1,000 crore for the same period under the National Disaster Relief Fund (NDRF).

CLIMATE CAMPAIGNERS SUE BNP PARIBAS

French climate campaigners from the NGOs Oxfam France, Friends of the Earth France and Notre Affaire à Tous are suing BNP Paribas over the bank's financing of fossil fuel projects. This is the world's first ever climate-related lawsuit against a commercial bank. BNP Paribas is the European Union's leading funder of fossil fuel expansion projects; its clients include Total, Chevron, ExxonMobil, Shell, BP, ENI, Repsol and Equinor. Recently, it loaned money to TotalEnergies for the East African Crude Oil Pipeline (EACOP), which has been projected to emit 379 million tonnes of carbon over its lifespan. The campaigners have called out the fact that despite joining the UN's Net Zero Banking Alliance in 2021, the bank continues to ignore scientific truths regarding the extraction and consumption of fossil fuels, and the climate crisis. BNP Paribas released a statement expressing regret that the campaigners had chosen litigation over dialogue. As the climate crisis continues to escalate, environmental lawsuits against the financial sector are likely to become more common.

PUBLIC DOMAIN/JOHNNY SILVERLIGHT

Climate campaigners are holding BNP Paribas, European Union's leading funder of fossil fuel expansion projects with clients such as ExxonMobil, accountable for its actions.

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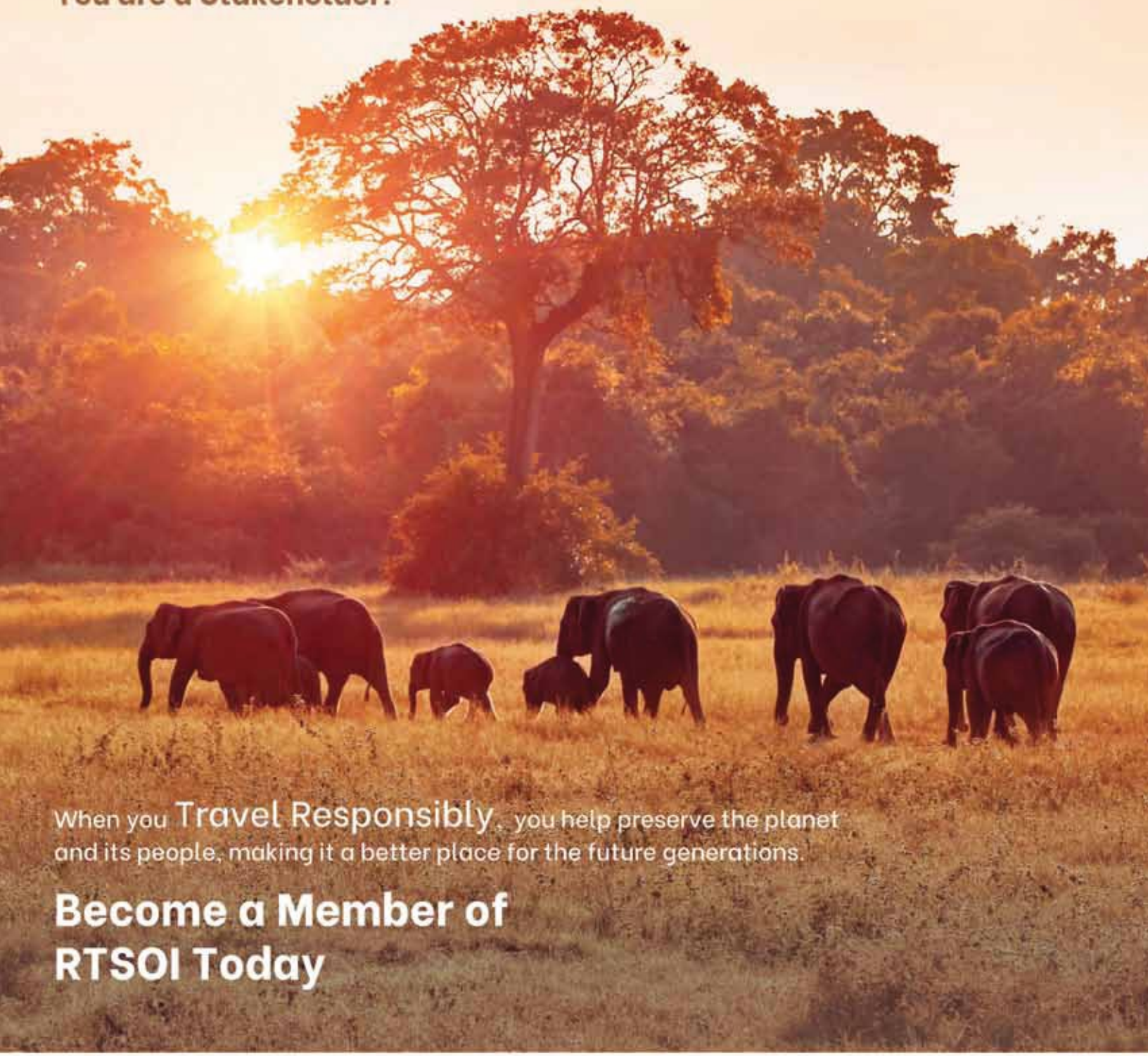

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GOBIND SAGAR BHARDWAJ

ISLANDS OF LIFE

Azure waters, white sandy beaches and salubrious weather make tropical islands attractive to those lucky enough to visit. But, beyond these attractions, islands are tiny laboratories for nature to 'experiment' on various species, resulting in high levels of species endemism, with scientists able to observe evolutionary changes and speciation, as seen in the Darwin's Finches on the Galápagos Islands. A global study on assessment of endemism and species richness across island and mainland regions published in the Proceedings of the National Academy of Sciences *quotes, "While island and mainland regions suffered equally from past habitat loss, we find the human impact index, a measure of current threat, to be significantly higher on islands. Projected land-cover changes for the year 2100 indicate that land-use-driven changes on islands might strongly increase in the future. Given their conservation risks, smaller land areas, and high levels of endemism richness, islands may offer particularly high returns for species conservation efforts and therefore warrant a high priority in global biodiversity conservation in this century." This makes the Andaman and Nicobar and particularly the Great Nicobar Island an especially attractive conservation project rather than a development model. Get ready to feast your eyes on a few key endemic species and breathtaking landscapes from Great Nicobar of the Andaman and Nicobar archipelago.*

Unlike the coral islands of Lakshadweep, the Andaman and Nicobar archipelago – comprising 836 islands, outcrops and islets – are formed on account of a submerged mountain range that extends from the Mentawai Islands of Indonesia. About 90 per cent of the islands are covered in monsoon forests and tropical rainforests, and form one of the 11 biogeographical regions of India.

GOBIND SAGAR BHARDWAJ

A handsome primate, the Nicobar long-tailed macaque *Macaca fascicularis umbrosa* is a subspecies of the crab-eating macaque. It is endemic to Katchal, Little Nicobar and Great Nicobar Islands in Nicobar. Recent studies have found tool use prevalent for foraging, hygiene, communication and play in these macaques.

GOBIND SAGAR BHARDWAJ

The Great Nicobar Serpent Eagle *Spilornis klossi* is smaller in size and lacks spotting on its belly compared to the Crested Serpent Eagle. It is restricted to the forested areas of Nicobar Islands and is categorised as Near Threatened on the IUCN Red List.

SAGAR RAJPURKAR

A gorgeously resplendent bird, the Nicobar Pigeon *Caloenas nicobarica* has a metallic plumage with green and blue hues and tones of copper and bronze. These beautiful birds face an uncertain future. Along with capture for the pet trade, poaching and invasive predators such as rats and cats, they now face the repercussions of massive habitat degradation and loss.

PANKAJ SEKHSARIA

Towering tree ferns *Cyathea albosetacea* form stunning fractals in the sky in the Great Nicobar Biosphere Reserve. Evolved during the Jurassic period, these arborescent ferns reproduce by means of spores formed on the undersides of the fronds.

DIGANT DESAI

The immense coastline of 1,962 km. hugging the Andaman and Nicobar archipelago abounds in rich marine and coastal biodiversity. Various checklists of marine fauna list 5,174 species showing 4.73 per cent (245 species) endemism, 1,434 fish, 588 coral, 75 marine sponge and 52 opisthobranch species, to which this *Phyllidia* species of nudibranch belongs. These vividly coloured shell-less molluscs are carnivores, feeding on corals, sponges and even other nudibranchs.

SANDEEP DHUMAL/SANCTUARY PHOTOLIBRARY

The Nicobar Megapode *Megapodius nicobariensis* is one of the rarest birds in India, found only on some Nicobar Islands. The population of 750-1,000 birds is threatened by local poaching, global warming, extreme weather events and most recently, the denotification of the Galathea Bay Wildlife Sanctuary.

GOBIND SAGAR BHARDWAJ

The blushing red face of a male Nicobar Long-tailed Parakeet *Psittacula longicauda nicobarica* peeps out from its perch. This parakeet subspecies is endemic to the Nicobar Islands, and large flocks are seen gathering during their breeding season.

ASEEM KOTHIALA

The Nicobar tree skink or olive tree skink *Dasia nicobarensis* is an olive-coloured arboreal skink endemic to the Nicobars. Conversion of forests into developmental zones would lead to massive habitat loss for these tree-loving skinks.

ASEEM KOTHIALA

The Nicobar treeshrew *Tupaia nicobarica* fluffs its stringy tail as it navigates through the continuous tree cover of Great Nicobar and Little Nicobar Islands. Cutting lakhs of trees for the Great Nicobar Project could spell a death knell for the treeshrew and other arboreal species found here.

SAGAR RAJPURKAR

Named after Dr. A. Daniel, a zoologist at the Zoological Survey of India (ZSI) and leader of the ZSI team that undertook the Great Nicobar Expedition in 1966, the Daniel's forest lizard *Bronchocela danieli* is endemic to Great and Little Nicobar Islands. An arboreal agamid, this lizard prefers forested areas. The male can be identified by its black and orange temples.


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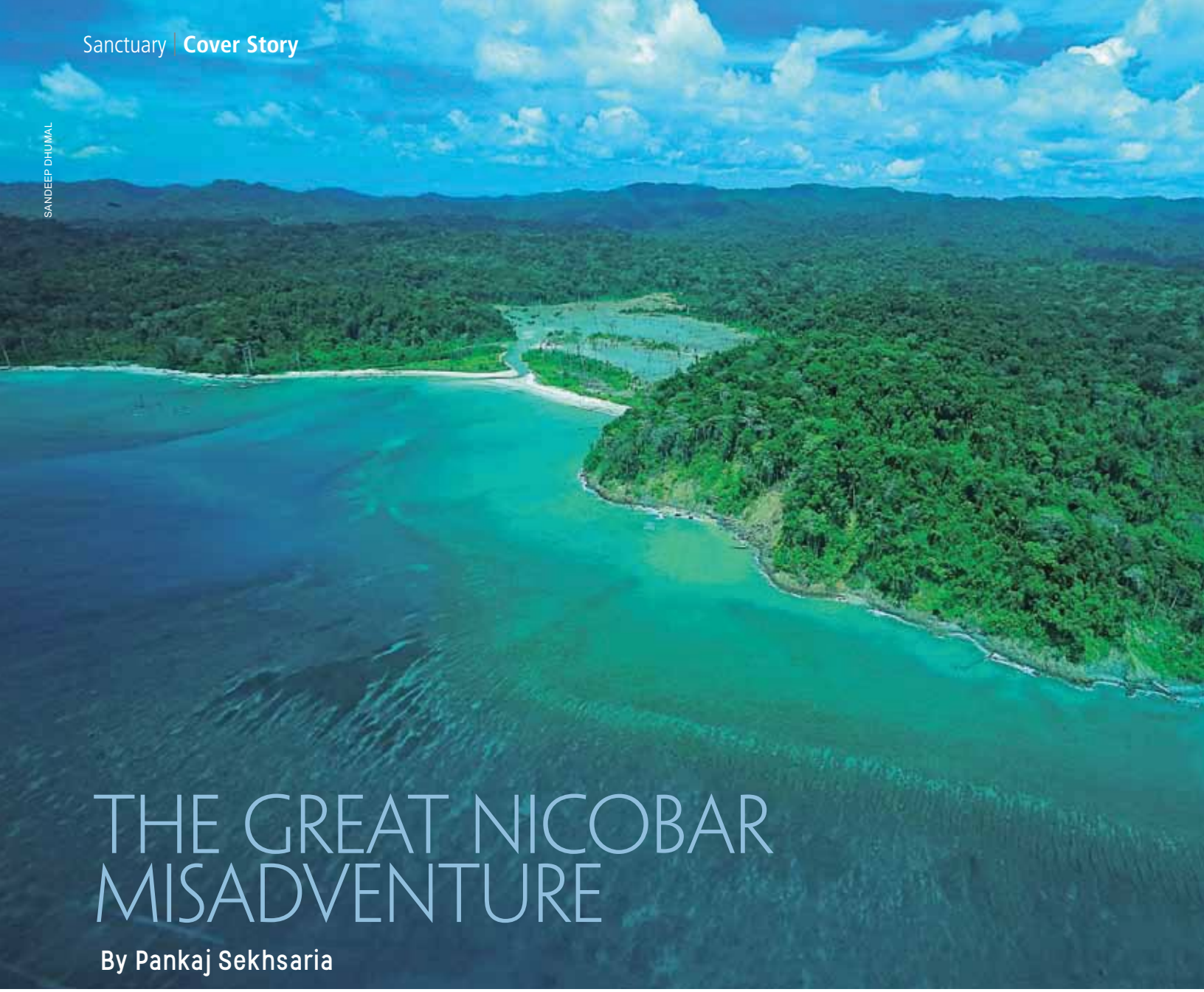


SANDEEP DHUMAL

THE GREAT NICOBAR MISADVENTURE

By Pankaj Sekhsaria

"Trees with nesting holes of endemic owls to be identified and geo-tagged with help from SACON. Such trees shall be safeguarded, as far as possible."

On November 11, 2022, the Ministry of Environment, Forest and Climate Change (MoEFCC) granted its final environmental clearance (EC) to a mega infrastructure project euphemistically titled 'Holistic Development of Great Nicobar Island'. It marked the culmination of a roughly two year-long process for the project, which will be implemented over the next three decades in the ecologically rich and geologically volatile Great Nicobar Island, the southern-most in the Andaman and Nicobar chain.

The quote above is one of the many conditions laid out in the clearance letter for this Rs. 72,000 crore project that has been piloted by the NITI Aayog and will be implemented by the Port Blair-based Andaman and Nicobar Islands Integrated Development Corporation (ANIIDCO). The plan's centre-piece is a Rs. 41,000 crore transhipment port to be constructed at Galathea Bay, a prime nesting site of the giant leatherback turtle. Other components include an airport, a powerplant and a greenfield township spread over 160 sq. km. of land, including 130 sq. km. of primary forest.

Covering roughly 18 per cent of the 910 sq. km. island, this is a mega project unlike any seen in India. Great Nicobar is important for multiple reasons – it is a rich repository of biodiversity and endemism, was declared a biosphere reserve by UNESCO in 2013, has two large national parks, is protected as a tribal reserve for the Indigenous *Shompen* and *Nicobarese* communities, and is also located in the world's most seismically volatile zone. It saw a permanent subsidence of under five metres in the immediate aftermath of the earthquake of December 26, 2004, which

FACING PAGE *This aerial view of Galathea Bay shows unbroken monsoon rainforests, stretching out as far as the eye can see. These forests are an immense, invaluable repository of endemic biodiversity, none of which can be revived once lost. The coastline that hugs this bay is India and Southeast Asia's biggest known leatherback turtle* Dermochelys coriacea *nesting site*

triggered the massive south and south-east tsunami. Thousands were killed and assets worth billions of dollars were destroyed in one stroke. The scale of the subsidence in Great Nicobar is evident from the fact that the light house at Indira Point, which was earlier situated well above the high tide line now stands completely surrounded by the waters of the Andaman Sea.

Logic suggests that the wise men in MoEFCC and its expert bodies would be particularly careful and diligent when considering clearance for such a massive project, given its exceptionally sensitive and vulnerable location. The condition quoted in the very beginning appears then to be an illustration of precisely such concern. A more careful look, reveals a vastly different picture.

MISSING THE TREES FOR THE FOREST Let's, for instance, unpack this 'nesting holes of endemic owls' condition. In a recent submission to the National Green Tribunal, the MoEFCC admitted that the land earmarked for the project on Great Nicobar has over 1.86 million (18.65 lakh) trees, and about a million are slated to be cut. An area larger than the size of Mumbai's Sanjay Gandhi National Park will be deforested in a few years even as a climate crisis lurks around the corner.

Consider this as well: nesting holes of owls are tough to locate in the best of situations. We are talking here of 130 sq. km. of pristine tropical forest with few – if any – regular visitors. Even if scores of India's finest birdwatchers were to work year-round to document all actual and potential owl nesting sites, it would be hopelessly unrealistic to survey one million ancient trees (some as tall as 45 m.) to identify the owls' nesting holes. Clearly a survey such as this will achieve nothing, if it ever takes place. Let's also ask the question whether Great Nicobar has any endemic owls at all, and the meaninglessness of the condition will become even more apparent.

Doublespeak runs through the environmental clearance granted. Take the condition that appears just above the one on endemic owls:

> "No trees will be cut at one go. (...) All trees which are *exceptionally tall and old* in age shall be *safeguarded, as far as possible*. A&NFD will mark all such trees and submit the species-wise list to the Ministry and EAC and the regional office of MoEFCC before infrastructure activities take place". (emphasis added).

For decades now, many experts have known that conditions imposed were meant to be followed in the breach.

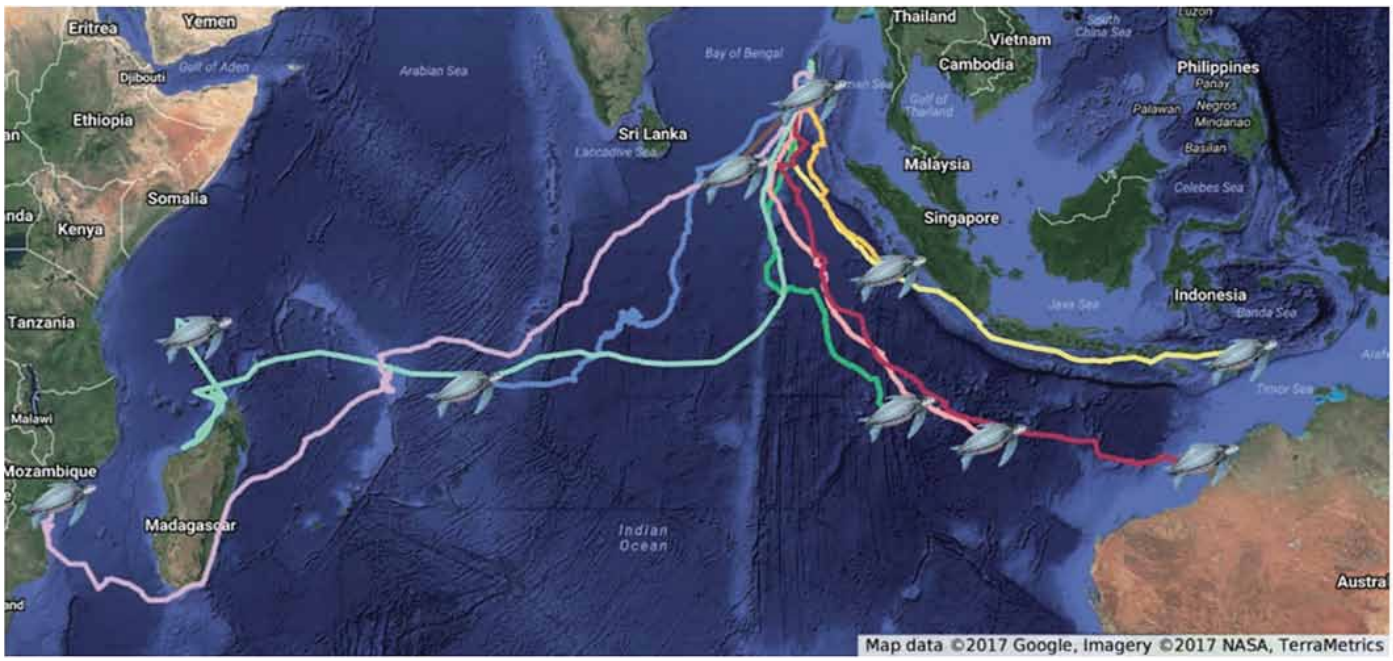
WHAT ENVIRONMENT IMPACT ASSESSMENT IS THIS? Hyderabad-based Vimta Labs released a draft EIA report of the project in December 2021 and a final version three months later, in March 2022. This report was the basis on which MoEFCC's key body, the Environment Appraisal Committee – Infra I, recommended final environmental clearance in August 2022, which was eventually then granted in November 2022. Below is an extract from the EIA consultant's Great Nicobar EIA study site visit report:

> "The hills are steep, slippery and totally covered by multi-storeyed vegetation. Whenever we could gain entry through some opening into the dense/thick forest, visibility was poor; humidity was high; soil was wet and slippery on account of intermittent sharp showers every day, [and there were] invisible streams of water under a thick carpet of dead leaves and twigs. Added to the problem was biting insects including mosquitoes. Further, when one tries to look upwards to find out what tree it is, it is not just one but many. Most trees are overgrown by heavy climbers and the tree-trunks are covered by epiphytes including mosses, lichens, epiphytic ferns and orchids. There was no threat of venomous snakes as they do not occur in the Island. It was impossible to use any measuring devices like tape to make any quadrat in the forest vegetation. Hence, intensive survey was carried out on both sides of the Campbell-Indira Point for four days. It is about 45 km. and the

In a recent submission to the National Green Tribunal, the MoEFCC admitted that the land earmarked for the project on Great Nicobar has over 1.86 million (18.65 lakh) trees, and about a million are slated to be cut.

ADHITH SWAMINATHAN

COURTESY DAKSHIN FOUNDATION

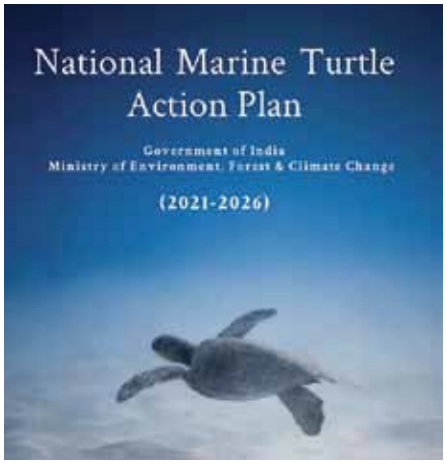


ABOVE *The Wildlife Institute of India ratified the denotification of Galathea Bay Wildlife Sanctuary inspite of not having done a single study on the nesting habits of leatherback turtles.*

FACING PAGE *The map shows the post-nesting migratory routes of tagged leatherback turtles, representing their tagged location and last known location for individual turtles.*

entire stretch was survey (sic) eight times in four days."

The sheer scale of this project and its possible impacts are staggering not just because of the ecological issues, but also the financial gamble involved. This is a Rs. 72,000 crore investment whose costs, going by past experience, are likely to be much higher before completion. We are talking about a tropical evergreen forest spread over 130 sq. km., a million old-growth trees, the northern Indian Ocean's most important leatherback nesting site and a geologically volatile area that experienced one of the most severe earthquakes and tsunamis in human history in December 2004. Where is the scientific rigour and expertise?



The draft EIA report had suggested erection of barbed wire fences to separate the Indigenous peoples of the forests from the thousands of outsiders who will be brought in as part of this holistic development. The suggestion was fortunately removed following objections by researchers and NGOs, but none of this was a red flag for the MoEFCC, which stated in its February 2023 submission to the NGT that "environmental clearance... has been accorded... after an extremely detailed and rigorous scrutiny process at the highest level, and with scrupulous adherence to the [relevant] provisions...".

And this is how we, in an era of an advanced climate crisis, signed away an ancient forest, a million trees, a bewildering array of biological diversity, and an irreplaceable repository of the planet's ecological history.

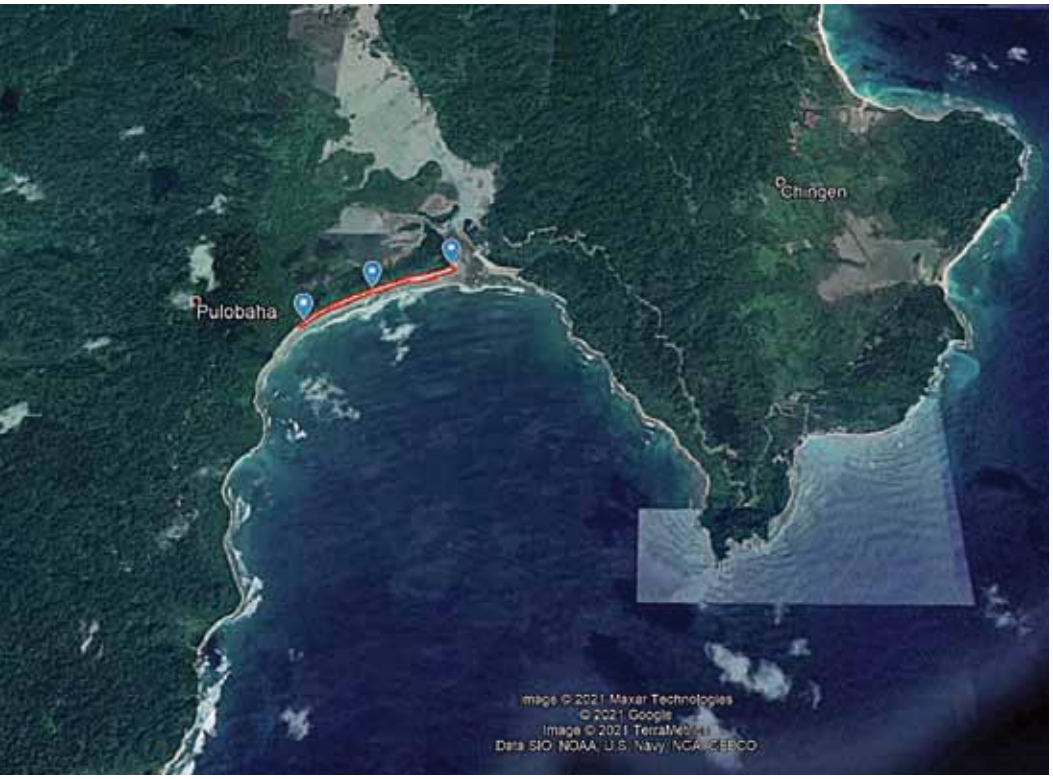
GALATHEA BAY AND ITS GIANT LEATHERBACKS

On the south-eastern coast of Great Nicobar, not far from Indira Point – India's southern-most tip – lies the beautiful Galathea Bay. It is here that Great Nicobar's biggest river, the Galathea, empties into the ocean and sets the stage for a spectacle of nature not seen elsewhere in this country. On either side of the Galathea, as it enters the Bay of Bengal, are long stretches of soft, silvery sand, where ancient giants come to nest every winter.

Nearly 500 nests of the ocean's largest turtles, the giant leatherback, have been counted here over multiple nesting seasons, including the two most recent. Galathea Bay is one of the most important leatherback nesting sites in the northern Indian Ocean, a living, breathing jewel in India's crown, unlike any other. The leatherbacks of Galathea also make connections that we humans are barely aware or even capable of. Some of them swim to Australian waters after nesting here; others go the same distance and more but in the opposite direction to the African coast, and then they come back... in journeys and rituals that are ancient and have been undertaken for millions of years before *Homo sapiens* appeared.

So, do we care about the leatherbacks and this jewel called Galathea Bay? In 1997, we seemed to when 11.44 sq. km., including the nesting beaches and the waters of the bay, was proposed as the Galathea Bay Wildlife Sanctuary, "for protection and propagation of the giant leatherback sea turtle". As recently as February 2021, the MoEFCC released India's National Marine Turtle Action Plan that listed Galathea Bay as among the most "Important Marine Turtle Habitats in India". The plan document has a preface message dated January 19, 2021 by the then environment minister Prakash Javadekar, that ended with the following statement:

The sheer scale of this project and its possible impacts are staggering not just because of the ecological issues, but also the sheer financial gamble involved. This is a Rs. 72,000 crore investment whose costs, going by past experience, are likely to be much higher before completion.



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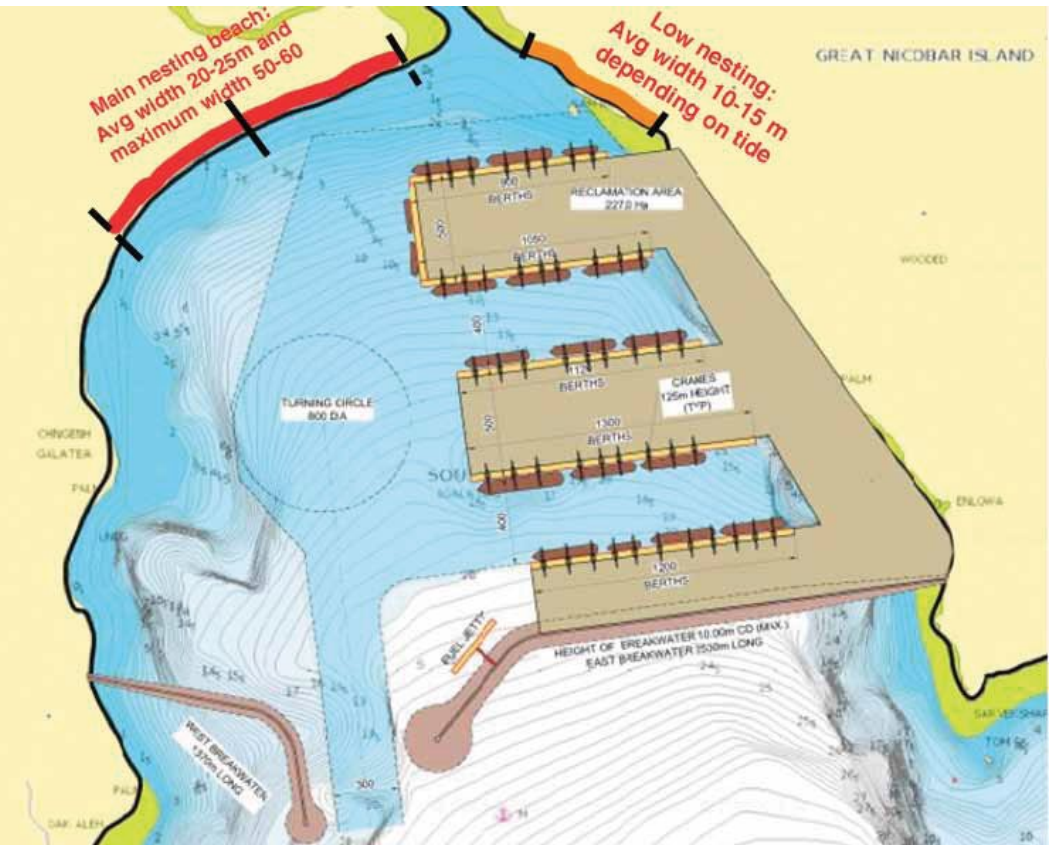


COURTESY 2021 AECOM INDIA PRIVATE LIMITED

ABOVE *The proposed port plan for Galathea Bay from the Pre-feasibility Report of the Holistic Development of Great Nicobar prepared by AECOM in 2021 shows that close to 90 per cent of the bay mouth will be blocked by the construction of breakwaters for the port, leaving the turtles with an opening of only 300 m. to reach their nesting beaches. Map annotated by researchers from the Dakshin Foundation.*

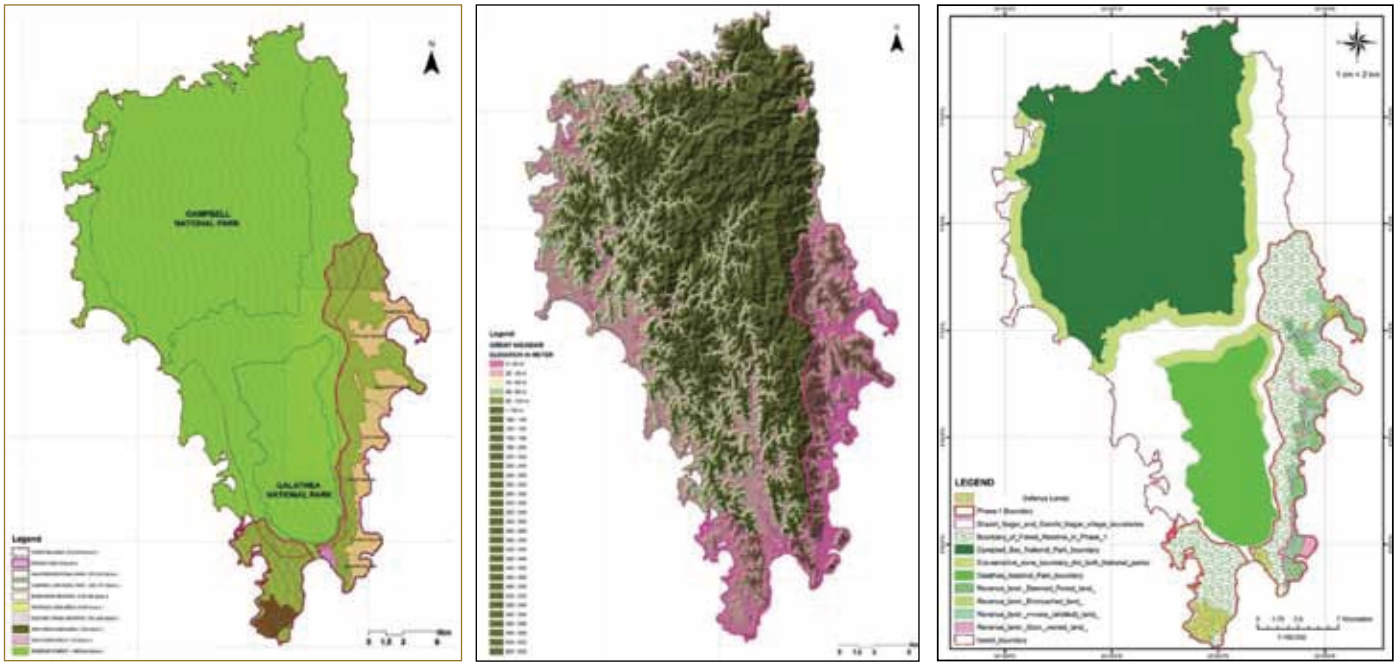
"I am confident that this 'National Marine Turtle Action Plan' will provide a fresh impetus to work towards conserving these magnificent species and their habitats and provide them with safe havens for their future and for a healthy planet."

Ironically, many months earlier it had already been decided that a port was to be constructed in Galathea Bay. Exactly two weeks before the minister signed the action plan, the National Board for Wildlife (NBWL) had, under his watch, denotified the sanctuary to facilitate the port construction. The denotification was also ratified by the Wildlife Institute of India, which recommended the development of a mitigation plan "so that marine turtles continue to nest on the beaches near Galathea Bay during both construction as well as operational phases of the International Shipment Project".

And this when the WII, by its own admission, has no experience of ever having worked on sea turtles anywhere in the Andaman and Nicobar Islands. Six months after ratifying the denotification and suggesting the idea of a mitigation plan, the WII was asked under a right to information (RTI) query for a list of its scientific studies and collaboration on leatherback turtles in the Andaman and Nicobar Islands. The WII had a short and simple answer – it had none! WII had not conducted a single study of leatherbacks in the islands and yet it signed away Galathea Bay for a port project they knew nothing about. The work of the MoEFCC and its expert committees had thus been simplified.

BUT WHAT WILL YOU MITIGATE? The absurdity of the NBWL and WII's position becomes doubly evident when one realises that they both approved the denotification even before the government would float a formal proposal for the project. The Sanctuary was denotified in January 2021, but the official 'prefeasibility report' for the project was released by the NITI Aayog-appointed consultant AECOM India Pvt. Ltd. in March 2021.

There is more. Just a cursory glance at the layout and the design of the port in the prefeasibility report (see accompanying image) illustrates the impossibility of effective mitigation. The leatherbacks nesting on the beaches of Galathea enter the bay today through a mouth that is



COURTESY 2021 AECOM INDIA PRIVATE LIMITED

ABOVE *Fig. 1 shows land use of the proposed project area, fig. 2 is a representation of the project area overlaid on a topographic map, while fig. 3 shows the locations of national parks, reserve forests and revenue land of Great Nicobar Island. Source: Holistic Development of Great Nicobar, Pre-feasibility Report (AECOM, 2021).*

more than three kilometres wide. As much as 90 per cent of this access will be blocked by the construction of breakwaters, leaving the turtles a mere 300 m. to reach their nesting beaches. This too in competition with huge ships, their sound and light, and the inevitable spills and pollution. The WII pliantly offered the planners the figleaf of 'mitigation' for mission impossible.

Back to the Environment Clearance conditions where the turtle is referred to 50 times in the entire document. The mouth of the bay will be pretty much cordoned off for the turtles, but this again is of no concern to the MoEFCC and its committees.

Here is an illustrative list of conditions and solutions laid down to ensure the future of the threatened turtles and to address the concerns expressed by those genuinely worried.

- Creation of a leatherback turtle sanctuary of 13.75 sq. km. at Little Nicobar
- Identification of WII as the scientific agency to prepare and implement conservation plans for leatherback turtles
- Placement of a "series of Ecological Marker Buoys for every 200 m. along the proposed extended breakwater line. Also, Marker Booms may be connected between the buoys. Such arrangement will clearly mark the 'Area to be avoided to aid turtles', warn restriction of the navigational route, thereby neither ships nor boats can enter the 'Turtle nesting area'. It would protect the turtles from the port operation (*emphasis in original*).
- Installation of deflectors to clear turtles from the path of the suctioning equipment. Underwater silt/sediment dispersal preventing curtains to be deployed to avoid deposition of silt on sandy shores.

And mitigation has been done!

THERE IS MORE Weeks before the environmental clearance was granted, the same ministry granted Stage 1 forest clearance to the project. The ministry's Forest Advisory Committee (FAC) agreed to divert 130 sq. km. of primary forest on the condition that these forests would be compensated by tree plantation in the state of Haryana, more than 2,000 km. away.

Expectedly, the proposal has been criticised by both legal researchers and ecologists, the former for its legal impropriety, the latter for its ecological damage and the notion that millions of years of botanical and zoological evolution in Great Nicobar could be compensated by tree planting in the Aravallis, in far away Haryana.

Both the scale of tropical forest destruction and the process followed are deeply problematic. The *Forest (Conservation) Act, 1980* mandates that proposals for forest diversion must be examined by the Forest Advisory Committee (FAC) and the outcome must be in the public domain. At the time of writing this piece (March 23, 2023), records on the MoEFCC website reveal that 26 meetings of the FAC were held in the two-year period between October 2020 – when forest clearance was sought for the Great Nicobar Project – and October 2022, when Stage 1 clearance was granted. Neither the agenda nor the

Galathea Bay is one of the most important leatherback nesting sites in the northern Indian Ocean, a living, breathing jewel in India's crown, unlike any other.

PANKAJ SEKHSARIA

TIMELINE

Mid-2020	The Andaman and Nicobar Islands Integrated Development Corporation (ANIIDCO) is designated the nodal agency for the implementation of the Holistic Development plan for Great Nicobar Island.
September 2020	NITI Aayog issues a 201-page request for proposal (RfP) for 'Preparation of Master Plan for Holistic Development of Great Nicobar Island'.
October 2020	A&N Forest Department sends the proposal for the diversion of 121.87 sq. km. of forest land and 8.88 sq. km. of deemed forest for sustainable development in Great Nicobar (Phase-I) to MoEFCC.
December 2020	AECOM India Pvt. Ltd. (consultant engaged by NITI Aayog) approaches Zoological Survey of India (ZSI) to prepare EIA report on marine ecology.
December 2020 - March 2021	VIMTA Lab Ltd. appointed by AECOM collects baseline data for EIA report.
January 2020	Galathea Bay Wildlife Sanctuary and Megapode Wildlife Sanctuary are de-notified.
February 2021	ZSI begins survey to assess biodiversity of Great Nicobar Island.
March 2021	Publication by AECOM of a 126-page pre-feasibility report titled 'Holistic Development of Great Nicobar Island at Andaman and Nicobar Islands'.
April 5-6, 2021	260th meeting of the EAC Infra-I: The EAC recommended the Great Nicobar proposal for grant of Terms of Reference (ToR) for preparation of EIA/EMP report.
April 14-19, 2021	WII conducts a survey to understand current status of beaches with respect to sea turtles in Great Nicobar Island.
June 2021	Leading turtle researchers and research organisations send a letter of concern to concerned authorities on impact of development projects in Little Andaman and Great Nicobar Islands.
December 2021	Publication of draft EIA report.
January 1, 2022	Public hearing held at Campbell Bay.
March 6, 2022	ANIIDCO submits the final EIA study and application for environmental and CRZ clearance to EAC Infra-I.
March 24-25, 2022	293rd meeting of the EAC Infra-I: EAC deferred the proposal citing the submission of the documents just two days prior to the meeting.
August 22-23, 2022	306th meeting of EAC Infra-I: EAC recommends the project for approval.
October 27, 2022	Stage I in-principal Forest Clearance granted.
November 11, 2022	Environmental clearance issued to the project proponent.
January 27, 2023	Ministry of Ports, Shipping and Waterways invites expression of interest (EoI) for construction of port in Galathea Bay.
March 7, 2023	Ten firms submit EoI to construct the port in Galathea Bay.

FACING PAGE *Given the fact that rising seas are likely to force several island nations to either relocate, or re-evaluate the past economic risk analysis results, investing Rs. 41,000 crore on a port project on precisely this coastline seems reckless and dangerous.*

RIGHT *The scale of the subsidence in Great Nicobar post-tsunami in 2004 is evident from the fact that the lighthouse at Indira Point, which was earlier situated well above the high tide line now stands completely surrounded by the waters of the Andaman Sea.*

minutes of these 26 meetings make a mention of the Great Nicobar Project. We must therefore infer that the FAC never discussed the project and yet, the clearance letter of October 27 mentions that "the proposal has been examined by the Forest Advisory Committee" and also makes it explicit that the clearance is based on its "recommendations". Emails sent in October and November 2022 and again in January 2023 to officers in the MoEFCC, in the Haryana Forest Department, and to members of the FAC requesting clarifications received no responses, clarifications or details.

WHAT ABOUT THE TRIBAL COMMUNITIES? It is the same for concerns related to the rights and the livelihoods of the two tribal communities for whom Great Nicobar has been home for eons – the *Nicobarese* and the *Shompen*. The latter is classified a particularly vulnerable tribal group (PVTG) and is a hunter-gatherer nomadic community, critically dependant on the forests of this island for survival.

The role of the institutions mandated here with the task of tribal welfare too is marked by apathy and a complete lack of concern. An example is the August 2021 letter by the A&N Administration's Directorate of Tribal Welfare. It begins by assuring that the island administration will protect the rights of the tribals and goes on immediately to say that the Directorate will seek required exemptions(s) from the competent authority "whenever any exemptions" are needed "for the execution of the project".

At the national level too, the Ministry of Tribal Affairs (MoTA) and the NITI Aayog seem to have completely abdicated their responsibility in the matter. Responding to an RTI application in early November 2022 that sought details on tribal issues in Great Nicobar, the MoTA's PVTG division said it had no information in the matter and kicked the ball towards the NITI Aayog and the Ministry of Home Affairs. On November 11, just four days later, the NITI Aayog promptly kicked the query back to MoTA for further necessary action. The Tribal Ministry's PVTG division responded on November 18, reiterating that it has no information in the matter and again kicked the ball upstairs to the Ministry of Home Affairs "for providing information to the applicant directly".

DISASTER VULNERABILITY Worryingly, the project site is located along a major tectonic fault. Janki Andharia and her colleagues at the Tata Institute of Social Sciences (TISS) have repeatedly warned that the risk this poses has not been accounted for. They had pointed in their comments to the draft EIA report that the islands have experienced nearly 444 earthquakes in the last 10 years and the plan for the container terminal here "needs to be reconsidered".

Andharia has first-hand experience of dealing with the impacts of a disaster in these islands. She was the leader of an intensive four year on-ground TISS effort, in partnership with the island administration, to reach out to the island chain's worst hit communities in the immediate aftermath of the 2004 tsunami. "Stating 'that building standards and codes will be followed' is inadequate," she says, commenting on the project authorities' response to her observations on the draft EIA report. "The meaning of 'making a structure earthquake proof' needs to be revisited in this context," she explains. "This cannot be the same as waterproofing a house because a post facto disaster response plan will not prevent a disaster from happening in the first place."

It is worth remembering that the light house at Indira Point stands in water today because the earthquake of December 2004 caused Great Nicobar's coastline to subside by nearly 4.5 m. Also, that Great Nicobar has experienced one earthquake on average every week over the last decade. Given the fact that rising seas are likely to force several island nations to either relocate, or re-evaluate past economic risk analysis results, investing an anticipated Rs. 41,000 crore on a port project on precisely this coastline seems reckless and dangerous. How, one wonders, would one calculate the permanent risk of yet another devastating earthquake and tsunami hitting the Great Nicobar coast?

CRITICAL JUNCTURE Concerns over the project, discussions in the media and questions in Parliament have thrust the Great Nicobar Island into the national limelight as never before. The last time it made the headlines was when the earthquake and tsunami of December 2004 struck.

Less than two decades later, we appear to have forgotten lessons from the past. This pristine island, its invaluable biodiversity, its original human inhabitants, plus thousands of crores of scarce money are being placed in harm's way. And the same goes for the possible 3,00,000 outsiders the project will bring to Great Nicobar Island.

This is surely a great misadventure and history will record that it was undertaken knowing fully well the lethal risks that lay ahead for the island, the people of India and the world.

DR. MANISH CHANDI

Remembering *Patai Takaru* – The Big Island

Dr. Manish Chandi has been associated with the Nicobar Islands for over 20 years now. He has closely observed and interacted first hand with the two Indigenous communities of Great Nicobar over many yearly visits for his research on their resource sharing and management strategies. In this essay, he takes us on a journey across the island, giving us glimpses of its people, forests and rivers, and all that is at stake just as 'the big island' is set to change forever.

Patai Takaru means 'the big island' in the southern *Nicobarese* language. Known to most of us as Great Nicobar, it is the largest among the more forgotten and marginalised islands in the Nicobar district of the Andaman Nicobar archipelago. Of all the attributes and unique features of Great Nicobar Island, the least studied and therefore the most misunderstood are its two Indigenous and aboriginal tribal communities – the *Shompen* and the *Great Nicobarese* (see box on page 37). The *Shompen* are forest dwellers, said to have first arrived in Great Nicobar more than 10,000 years ago, and the *Nicobarese,* who live along the coast of the island, are a more plural community than the *Shompen*.

Like many *adivasi* people, these communities have engineered a self-sufficient and sustainable way of living, one that is perfectly suited to a tropical island. Newer generations are guided by their traditional values, rooted in the managing and sharing of natural resources; their belief systems that transfer their knowledge of the limits to the island resources; and their social structures, built to avoid conflict over those resources. I have been to their villages and settlements and seen them thrive. I have also seen their lives get upturned after the tsunami and worked with them to rehabilitate their new villages. I have been a witness to the slow transformations their traditions have been subjected to and the impoverishment their younger generations continue to suffer. As I write this piece, I am aware that 10 entities have shown interest in building a commercial transhipment port at Galathea, and I am taken back to where it all began for me. I am sharing my memories of my visits to the islands in the hope that these recollections will fill in some of the gaps left blank in the 'holistic' development proposal for the islands.

THE BEGINNING OF MY ASSOCIATION I arrived in the Andaman Islands mid-1995 as a conservation corps volunteer with WWF-India working alongside the Andaman Nicobar Environment Team (ANET), a former division of the Madras Crocodile Bank Trust. I visited Great Nicobar Island in 1996, to both witness the arrival of female leatherback sea turtles at Galathea Bay beach and to meet Dr. Ravi Sankaran, who had been studying the Nicobar Megapode. Accompanied by my friends Sohan Shetty and Arjun Shivsundar from the Pondicherry School of Ecology, we boarded the MV Sentinel, a rusty and slow-moving ship, and she chugged away over the beautiful blue waters, stopping at every island port that had a jetty to offload cargo and passengers. We reached Great Nicobar after a four-day long journey with fellow passengers and roaches for company, and the bracing sea breeze for comfort. Having secured our Tribal Area Permit from the Assistant Commissioner's office, we headed to the Galathea river, the last stop of the State transport bus service. At point 41 (the number referring to the distance in kilometres by road from Campbell Bay), there was a narrow opening into the forest towards the creek, opposite to which was a signboard that read 'Galathea Wildlife Sanctuary'. A makeshift bridge made of logs, tied with old steel cable and nylon ropes was laid across the calmly flowing river. A marshy littoral forest took us towards a pump house adjacent to the creek, with a small well where we would bathe and wash clothes over the next weeks. Beyond the creek was a patch of mangroves dominated by Nypa palms and Rhizhophora strands, and further ahead was the dense evergreen jungle. The small board along the path led to the beach where the Forest Department sea turtle monitoring camp was located. Thatched huts and one wooden building on stilts made up the camp, which was fringed by lush Barringtonia trees. The camp was in a clearing – clean, quiet and sheltered, or so it seemed (the tsunami of 2004 showed us how naïve we were).

THE *NICOBARESE* AND *SHOMPEN* VILLAGES The next day, we crossed the rickety bridge and walked till the 43rd km. to reach Chingenh – the only *Great Nicobarese* village that was situated on the east coast on the other bank of the Galathea river mouth. As we entered, we were met by the village Chief, or the 'Captain,' Mr. Sitaram. He took on this name beyond his own *Nicobarese* name about two decades ago through the acculturation process. He said that he wanted to be seen as an Indian, with a name easy for '*sahibs*' to use. Captain Sitaram was an articulate and savvy man, well known among senior officers at Campbell Bay; they would always come to Chingenh when they wanted to see a *Nicobarese* village and Sitaram would show them around. His younger son Kimoss, a young boy then in 1996, went on to become the village Captain after the tsunami of 2004. We also met Mr. Mathew, a gentleman with severe

FACING PAGE *Great Nicobar is the only island in the entire archipelago with five perennial rivers. Both the communities use the river streams as sources of water and food. The forests and water courses have a special place in the cultural rituals relating to celebration, identity, births and deaths of both the communities.*

ABOVE *This outrigger canoe, referred to as* reuii *in the southern* Nicobarese *language, is made out of light wood, with a mast to fit a lateen sail; a distinct decorative frontispiece; and a tail that can distinguish one canoe from another.*

filariasis, which impaired his mobility, who was skilled in carving model *Nicobarese* canoes and huts to earn an income. I bought my first *Nicobarese* canoe from him and it survived 20 long years. Referred to as *reuii* in the southern *Nicobarese* language, it is an outrigger canoe made out of light wood, with a mast to fit a lateen sail, distinct decorative frontispiece and a tail that can distinguish one canoe from another, which are often quite creatively named. These canoes are also revered and celebrated as cohorts in community and spiritual life among some of the Nicobar Islanders.

The village of Chingenh was a beautiful settlement of 15-20 huts along the Galathea beach, spread under the shade of coconut and a few areca palms. It sat between the forest and the coast, a pattern seen in nearly all *Nicobarese* villages across the entire archipelago. Captain Sitaram showed us around and took us into a home to have tea and a breakfast of barbecued fish and tender coconuts, cut into long strips. We were introduced to Kagaz and Rose, then young *Shompen* children who, I later learnt, belonged to the Kurshinom and Kirasis Shompen settlements (these *Shompen* villages are located in the forests, which are to be cleared for the associated infrastructure of the transhipment terminal). Captain Sitaram had adopted the children, though he did not claim any ownership over them. Sometimes Kagaz and Rose would go back to visit their bands (see box on *Shompens*) in the jungle and return to Chingenh when they wished. Adoption of children is common among the *Nicobarese* community and not just for childless couples, but also as an inclusive means to help poorer families feed their children, and raise a village together.

Like many adivasi *people, the* Nicobarese *and* Shompen *have engineered a self-sufficient and sustainable way of living, one that is perfectly suited to a tropical island.*

RE KAYIL – THE GALATHEA RIVER We spent three days shuttling between Chingenh and the Forest Camp at Galathea Bay, where we witnessed the fascinating arrival of huge female leatherback sea turtles at night. The effort, strength and instinctive behaviour of these massive, but passive, wild animals that visit the shores only to lay their eggs is like a supernatural phenomenon we were lucky to witness. We decided to explore Re Kayil – the *Nicobarese* name for the Galathea river. We learned from Captain Sitaram that one can only go upstream to a certain length, after which there are rocky overhangs as the evergreen forest takes over from the estuarine mangrove regions. The three of us – Sohan, Arjun and I accompanied by one forest guard set out in a small fibreglass boat owned by the Forest Department. As we rowed up the river, dense thickets of the Nypa palm growing all over the banks obscured our view of the forest beyond. At several places, we could see gaps among the thickets that were the openings to the paths used by the *Shompen* to come to the river for fishing, and for *Nicobarese* as hunting paths into the forest. As we looked out for birds and wildlife, we were lucky to spot a few saltwater crocodiles – the largest predators of these dense riparian forests – before they vanished underwater. Being oblivious to their presence was better than knowing that their huge, strong bodies lay somewhere beneath our little row boat's path.

We finally did meet with Dr. Ravi Sankaran, the first Indian to have studied the endemic Nicobar Megapode. He had set up camp further from Chingenh at the 47th km. along the coastal forest, in a space he called the den of megapodes. Ravi, gave us many pieces of advice, of which the first was, to introduce ourselves and take permission from each village Captain before conducting any work in the area. He said, "Remember, this is their land; their space and their rights matter more than ours".

THE EAST-WEST ROAD – A WALK TO REMEMBER My second and one of the most memorable visits to Great Nicobar was later that same year. I took up the task of profiling the coastal vegetation of the island for a project under the United Nations

Development Programme. Partly owing to the requirement of the task but mostly driven by my own desire to explore the forests of the island, I decided to walk. Armed with a red backpack with essentials such as a machete, umbrella, torch light, match box, water, rations and a few cooking vessels, I planned to walk along the East-West Road that passes through the centre of the island bisecting it into two halves and reach Kopenheat, a *Nicobarese* village.

I walked past labourers who were repairing the road, on to a path that cut through the jungle. I can still remember how green everything looked and how wet everything felt. I was enamoured by the sights and sounds around me. There were tree ferns all along the path and intriguing bird calls filled the otherwise silent surroundings. From time to time, the Nicobar long-tailed macaques sounded alarm calls, alerting other troop members of my presence. As I walked along the curvy road, I noticed the *lajwanti* (touch-me-nots) everywhere, growing so thick at some places that it poked my feet through the gaps in my sandals. I filled my bottle with pure, cool water from the brooks and streams along the culverts. I reached my first stop along the East-West Road – the *Shompen* ashram complex, which was meant for facilitating the exchange of items between people. I spent my night in the hall-cum-kitchen of the complex with the labourers who also ate and slept there. As I was about to start again the next morning after having breakfast, four *Shompen* men came in with some freshly caught shrimps and ate it with some rice and *kukdi bhaji* – the local name for an edible variety of ferns. The Tribal Welfare Officer, a lady called Shabnam, insisted that the *Shompen* men take me, their *tamyon* (the *Shompen* word for big brother), to Kopenheat to meet Makkan Buddhi and Mr. Vishwanath, leaders of the village. As we started, it became apparent that they were not keen to walk with me. Besides, I could barely keep up with their quick pace, with my luggage further slowing me down. By the time I trekked up the valley and came out onto the road, they had disappeared deep inside the forest and I was on my own again. As I walked on, I came across two to three bands of *Shompen* men, some returning with freshly caught eel, carrying fishing spears and others heading to the ashram for tobacco. All the groups would stop to examine my backpack and ask me if I had any tobacco. They were not interested in

The village of Chingenh, a settlement of 15-20 huts along the Galathea beach, sat between the forest and the coast, a pattern seen in nearly all Nicobarese *villages across the entire archipelago.*

DR. MANISH CHANDI

BELOW *Late Captain Sitaram of Chingenh village, at the 7th km. Campbell Bay, now called New Chingenh. He built this house despite being given a 'permanent shelter' by the government in the interior. A preference to live by the seaside is ubiquitous across the Nicobar.*

DR. MANISH CHANDI

LEFT *Kohoi, a* Shompen *man, who Manish met along the East-West Road. Men like Kohoi frequent the Tribal Welfare Department to collect rice, which they use as a supplement to their diet and also share amongst each other. The rainforests and water courses of Great Nicobar Island provide all their nutritional needs, which are hunted and gathered, as do small cultivation plots the* Shompen *maintain.*

any of my belongings – some of which even made them laugh at me, for reasons I will never know. Upon not finding tobacco, they would leave and I would repack my stuff and continue walking. My comfortable walk along the cool shady road was interrupted at several places as the roads were washed out by landslides and rain that forced me to trek down the valley through the forest and trek up the road again where it was intact. Hours later that evening I could hear the sea and was happy to be reaching Kopenheat. But the path would still continue for a couple of kilometres, with no end in sight. Finally, I caught sight of the narrow beach. I was finally on the West coast.

KOPENHEAT TO CHINGENH My arrival at the beach startled two little girls who were playing in the sand, who ran towards their settlement. I was received by Mr. Vishwanath, who introduced me to others and took me to meet Makkan Buddhi. I stayed with them for a couple of days and collected information on the coastal vegetation. I did the same along each of the *Nicobarese* villages on the south west coast as I passed them – meeting people, noting names of the plants that were growing naturally as well as the ones that were being cultivated by the *Nicobarese*... and asking them for what purpose the plants were used. Moving southwards, I passed the villages of Koshindoun, Tenlet and Pulo Bhabi, which roughly translates to 'the place with many pigs'. Pigs have a special place in *Nicobarese* culture. They are reared with great care, kept in designated places under the huts and only fed the choicest of coconuts. They are exchanged as gifts, used as barter and feasted upon during festivals and ceremonies. Pigs are a symbol of prosperity. Thus the village of Pulo Bhabi was considered prosperous as more pigs meant a lot of coconut trees and many able-minded people who would help in rearing the pigs.

Further down from Pulo Bhabi, I passed Kokeon and Pulo pukka, situated along Nanjappa Bay. Next, I walked through the *Nicobarese* villages of In Haeng loi, Pulo bha and Hingloi, located around Pemmaya Bay. Both villages are now demarcated for coastal tourism, institutions and port logistics. Next, I crossed Pygmalion point, better known as Indira Point, situated on the southernmost tip of Great Nicobar Island. The *Nicobarese* call the area *Ku*. According to their belief system, *Ku* is an unsafe place where an evil spirit and its cohorts reside and cause harm to whoever crosses by. Determined, I continued walking and finally reached Chingenh.

In 2018, I visited the island to prepare a report on the stakeholders' opinion about the development project. My colleagues and I visited and interacted with members from all communities on the island.

THE SOUTHERN AND THE NORTHERN *GREAT NICOBARESE* After the two visits to Great Nicobar in 1996, I spent the next couple of years working in the Andamans. In 2000, I revisited Nicobar, driven this time, to understand how the *Nicobarese* utilise resources on the island and how they differ from one island to another. As I started mapping the settlements and place names used in various villages, it became apparent that there are not one but two linguistically and culturally distinct groups of *Nicobarese* living in Great Nicobar. Beginning from the village of Pulo kunji located almost on the centre of the West coast till the southernmost village including Chingenh on the East coast, where the *Nicobarese* language was in use, the people can be grouped as the Great (southern) *Nicobarese* or *Payuh patai takaru*. While northwards from the village of Pulo Bed, Rekoret, Renhong, Re maun, Afra Bay, Kondul and Pulomilo islands and all of Little Nicobar Island, where the language of the Little *Nicobarese* is in use, the people can be grouped as the Little *Nicobarese* of Patai ta-bhi (Little Nicobar). Both have their unique dialects of the *Nicobarese* language, and variations in their social and cultural practices. They do intermarry and some also identify common ancestors from both groups. Despite this, their territories and land ownership are unique to each group

THE 2004 TSUNAMI AND ITS AFTERMATH On the day of the tsunami, December 26, 2004, close to 250 members of the *Nicobarese* tribe living along the west coast perished. Only nine survived. Those nine people, four men and five women survived on their own for

DR. MANISH CHANDI

RIGHT *Late Kagaz weaving a thatch roof to replace the tin roof of his permanent shelter at New Chingenh. Kagaz was a young* Shompen *man, who was partly raised by Captain Sitaram at old Chingenh from 1993. He lived both in the forest and at the settlement of Chingenh, illustrative of the fluidity among the two Indigenous communities of Great Nicobar Island– the* Shompen *and* Great Nicobarese.

35 days, after which they reached and crossed the Galathea river. A team of us who were looking for survivors found them there and got them to Campbell Bay for treatment and to begin life anew. These surviving members of the *Great Nicobarese* tribe were relocated by the Andaman administration after the tsunami to 'safe ground' at Campbell Bay, the headquarters of Great Nicobar Island and the Southern Nicobar administrative division. They continue to live in two settlements in Campbell Bay – Rajiv Nagar and New Chingenh, that were supposed to be temporary, as they wished to go back to their ancestral lands. But the Andaman administration wishes to make them permanent settlements for their administrative convenience. Their appeal of 18 years to be resettled in their pre-tsunami villages has been ignored and shaded by unkept promises of the Andaman Nicobar Administration. They have lived in desperation for nearly two decades, working as manual labourers to earn an income in the shanty town of Campbell Bay – in many ways, they are strangers in their own land of *Patai Takaru*. Their distress and discomfort can be seen in many fighting alcoholism, traumatic stress from their displacement, and a lack of acceptance by the mainlander population who have no sensibilities of their island life and just identify them derogatorily as '*holchu* (*Nicobarese* word for friend) tribal'. Many in the remnant community suffer from depression due to being displaced, and from various other ailments on account of changed diets and sources of nutrition, and an inability to perform what they see as their normal duties, which would lead to a peaceful, happy livelihood. The despair can be seen in the cemented pathways leading to the 'shelters' built for them by the government after the tsunami. Cracked, broken and washed away by incessant rain, slush and litter of the high ground and a lifestyle eked out from ration supplies and snack shop goods in Campbell Bay. They don't own their own coconut, areca or banana plantations and are forced to be dependent on the cash economy rather than their own, which was a mixture of barter, their own labour and of sharing of natural resources and produce amongst kinship groups and friends. At Campbell Bay, they indeed are strangers in their own land.

WHAT THE PORT PROJECT GETS WRONG ABOUT THE TRIBES My most recent visit to the island in 2018 was to prepare a report on the stakeholders' opinion about the development project, which was commissioned by NITI Aayog. Together with anthropologist Dr. Vishwajit Pandya and film-maker Anirban Dutta Gupta and members of the Andaman Adim Janjati Vikas Samiti (AAJVS), we visited and interacted with members from all

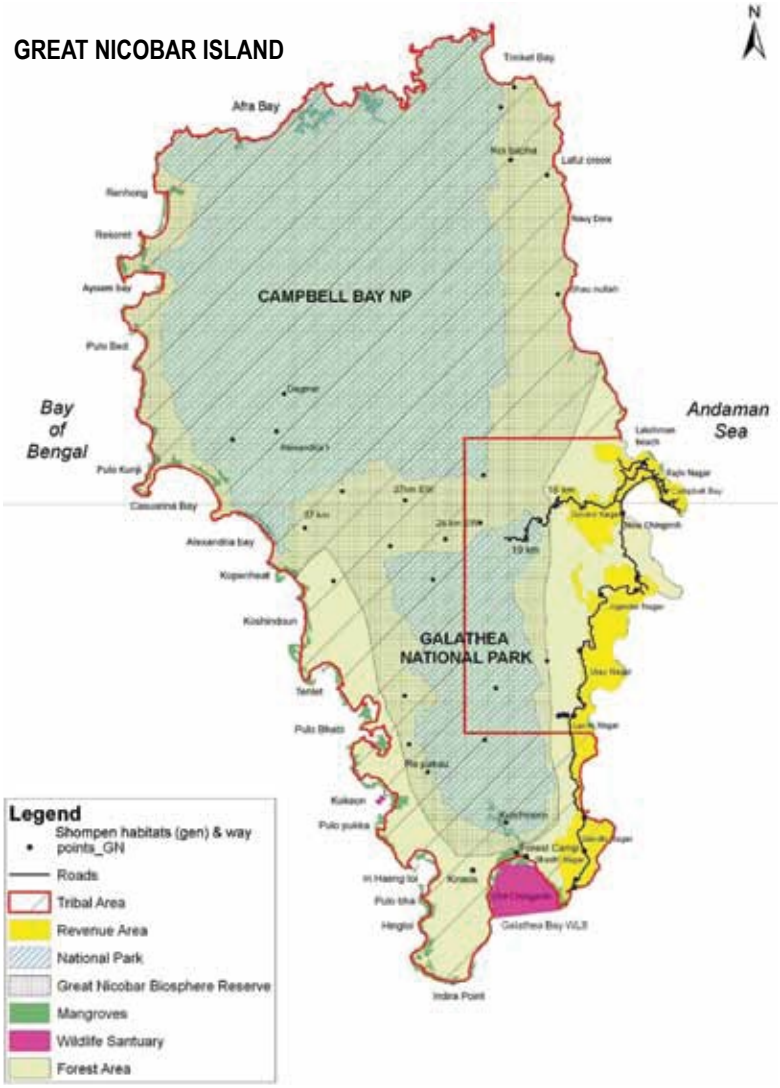
The Indigenous people of *Patai Takaru*

The *Shompen*, approximately 250 in number, are nomadic hunter-gatherers and horticulturists who live in groups or bands of 20-50 persons in the interior forests and along water courses. They harvest wild pandanus fruits; hunt animals, various fish and saltwater crocodiles; and grow chillies, lemons, taro and tubers. The *Great Nicobarese* are a coastal islander community who herded pigs and chicken, whilst cultivating coconuts, areca nuts and a few tuber crops too. A large part of their diet includes pandanus and sea food and they are expert craftsmen, their skill visible through the type and variety of huts they build from natural materials that are perfectly suited to the local climate.

Before the 2004 tsunami, they were distributed along the southern and south western coast of Great Nicobar Island across 11 villages. Today, they are an internally displaced community, about 420 in number, making them the smallest of all the *Nicobarese* sub-groups of the Nicobar Islands. The nine survivors of the tsunami along the west coast were united with the rest of their community members, some who were in hospital or visiting friends, or working, studying elsewhere beyond their homes. They are the last of their once larger islander community.

Many families of retired military personnel were settled here by the government; other mainlanders followed over the years for farming, business, construction, etc. They look forward eagerly for a better livelihood and employment opportunities. The Indigenous tribes and settlers are very distant from each other culturally in their desires, needs and outlook for a future on the Big Island.

COURTESY DR. MANISH CHANDI



TOP *Map of Great Nicobar Island showing the prevalent land use pattern. The coast from Galathea Bay (south-east), along the entire western, northern and part of the north-east coast close to Campbell Bay, was originally reserved for the Indigenous communities.*

Spirits of the forests and friends of the sea

According to a belief, there is a black stone in the forest which is alive – they call it *tirah*. Making sounds near the *tirah* by cutting trees or shouting leads to high fever, bloody vomit and eventually, death. There is a tree called *chat-mat* in which a spirit resides, and anyone who tries to chop its branches or cut it gets swollen eyes and chicken pox-like spots all over their body.

The Indigenous islanders have many stories featuring various animals they share spaces with. According to one story, a wild pig and a girl got trapped underground and continue to live there. When the spirit of the pig cries or gets angry, it causes the ground to shake and earthquakes are caused.

They have many beliefs involving marine species. For instance, hunting a *hipot* (dugong) causes storms and cyclones. Hunting a *kapoaak* (dolphin) is a sin. They are equated to human beings as they are very smart. It is said that in earlier times, when someone was lost at sea, dolphins would bring them back to the shore. The *hikunth* (leatherback turtle) is only consumed by elders as its meat is believed to have anti-ageing properties. The meat of the *kao kayil* (hawksbill turtle) is to be eaten with great care as it may be poisonous, depending on the algae it feeds on. It is believed that if a pregnant woman or a member of her family consumes it, the child will be born with a deformity.

communities on the island. While the Little *Nicobarese* were not in opposition to the development plan, they were clear that they did not want tourism as they enjoy their peace and quiet on their own terms and were not in need of income by selling their culture and vistas to outsiders. The *Great Nicobarese* on the other hand were despondent. They were looking for a better life after the devastating tsunami of 2004, and hoped that despite the enormity of loss in lives of their kin, their traditional coastal lands and resources, they would one day return to their ancestral lands and the sound of waves washing their shores, to grow coconuts, rear pigs and chickens, and find fresh fish from the reefs off their village coasts.

Though, the administration and project proponents have assured that the *Great Nicobarese* will be relocated once the roads are built, crucial information regarding the locations of the proposed projects have been withheld. The *Nicobarese* still believe they will return home. Their ancestral spirits guard those lands in their absence, and they await the time when they can return and walk those sandy beaches without having to live a life that has been forced upon them. The government should listen to and learn from the *Great Nicobarese* about Great Nicobar, *Patai Takaru*, which is more than its naturally occurring deep drafts, and proximity to a trade route. It is the last among the few places left on the planet where people are not separated from nature, but are a part of it. It is the only home of two cultures who have mastered sustainable living before it became a catchphrase for development projects. But would the voices of the *payuh* of *Patai Takaru* matter? Or will the Great Nicobar Transhipment Port be built over the ashes of their ancestors?

Dr. Manish Chandi completed his doctoral thesis on understanding how resource sharing mechanisms are an integral part of natural resource management in the Nicobar Islands from the Nature Conservation Foundation, Mysuru. He has worked for long with the Andaman Nicobar Environmental Team as a researcher in Human Ecology and as Field Director.

NICOBAR, WHAT'S TO GO

COURTESY MEENA SUBRAMANIAM

Acrylic on canvas,
Size: 81cm. x 98 cm.

Obliteration, omnicide. Two words that encapsulate my thoughts on the recent Government of India's decision to callously earmark Great Nicobar for a transhipment port to further industrial business interests over the sheer magnitude of its unique biodiversity. A sizeable 13,000 acres of virgin rainforest, one of the most unique on the planet is to be clear felled to make way for it. Along with this rainforest, the port will entirely destroy the biodiversity and unique and diverse ecosystems, rip the *Nicobari* Indigenous community from their roots and render them homeless and culture less.

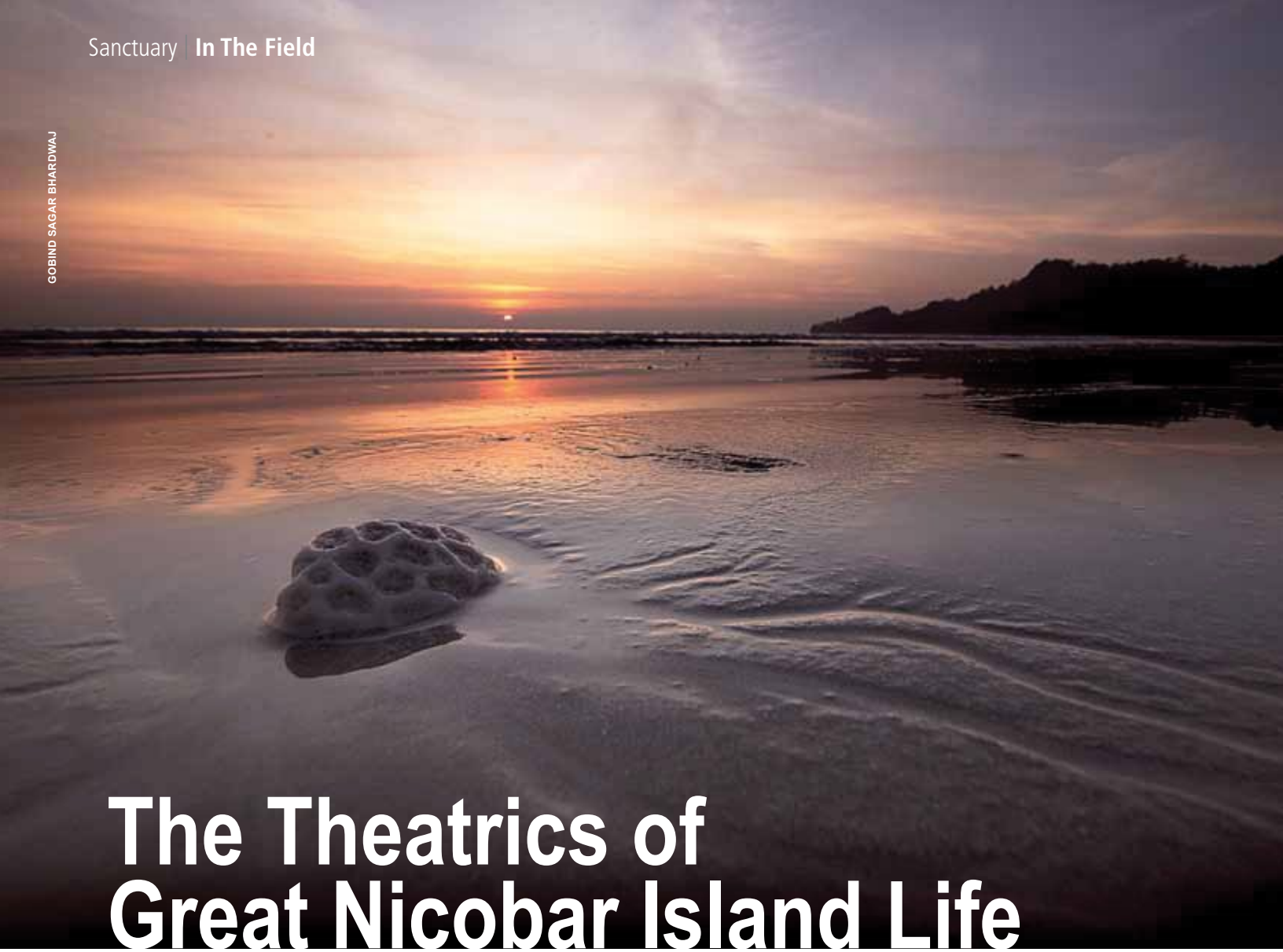
The archipelago constitutes unique species and sub species of birds, mammals, plants and invertebrates. Ancient trees clothed with creepers and lianas cover the rainforest.

There is marine life, which includes endangered turtles that use the island's beaches for nesting. There is a fragile mangrove ecosystem that keeps sea water at bay and protects these forests and interiors.

A few species slated for man-made extinction are included in *Sanctuary*'s April 2023 issue cover illustration:

The Nicobar treeshrew, a unique mammal which looks like a cross between a rat and a squirrel. The Nicobar long-tailed macaque, a frugivore that also subsists on crabs, frogs and small insects and has a diverse habitat ranging from mangroves to evergreen forests. Avian life includes the rare Nicobar Megapode, the Nicobar Scops Owl and the Nicobar Pigeon. Floral diversity encompasses the *Phalaenopsis tetrapsis*, with its randomly blotchy flowers, the endemic and showy *Etlingera fenzlii*, a torch ginger whose parts are exclusively used by the *Shompen* tribe as a bee repellent when collecting rock bee honey and the Nicobar tree fern, *Cyathea nicobarica*, endemic to the Nicobars.

Meena Subramaniam is a nature and conservation artist who lives near the Periyar Tiger Reserve. Her work has been featured in several magazines, including *Sanctuary Asia*, *The Indian Quarterly, The Dark Mountain* and the Marg issue, *Ars Botanica*. She is also the recipient of the 2018 T. N. Khoshoo Memorial Award for pioneering work in ecological art, in 2018. She has recently made a small contribution of illustrations for the tome, *Trees of Arunachal Pradesh*, NCF. Her preferred medium is acrylic on canvas and occasionally watercolours.
For more: meenart@artwanted.com; www.meenart.in or Email: kodaifern1@gmail.com



GOBIND SAGAR BHARDWAJ

The Theatrics of Great Nicobar Island Life

By S. Jalihal

I always wondered what the Nicobar Islands would be like. While preparing for my trip there, I packed my snorkeling gear, excited at the prospect of exploring the glassy blue waters surrounding the island. I hoped to swim above coral reefs and have unique encounters with a variety of fish of different shapes, colours and sizes. However, soon after my arrival, I was disappointed to see sign-boards on beaches that declared 'Swimming not allowed' – I later learnt the reason for this was the sudden increase in the depth of the waters near Great Nicobar's beaches, and the abundance of crocodiles here. This itself is the perfect example of how enigmatic the island is: wildly unpredictable, brimming with diverse life-forms and supporting the many habitats that nurture them. After spending a few days here, I tucked my snorkeling gear deep into my backpack and began looking at the island through a fresh lens – stripped off of the usual expectations that short-term travelers tend to have when they visit coastal spaces.

Great Nicobar is wildly unpredictable, brimming with diverse lifeforms and supporting the many habitats that nurture them.

If the island were a play, it would have three main acts – the forest, the shore, and the underwater. Scenes change as the day progresses, and different creatures take charge of the play. While some stand out in their extravagant costumes, others camouflage themselves in the surroundings, quietly playing out their respective roles. Yet others take centre stage, creating loud but harmonious sounds. Stage lighting duties are shared by the sun, moon, stars and the clouds, all collaborating to create a unique backdrop for each performance. And, of course, the frequent and unpredictable showers the island receives can be relied upon to enhance any dramatic scene with noisy patter.

CURTAIN RAISER On most days, the sun rises around five a.m. On shore the waves are calm, slowly creating haphazard patterns on wet sand. Against the backdrop of a rosy-hued sky and in contrast with the azure water, thrifty hermit crabs busy themselves with finishing the night's work. Supporting actors of the intertidal ecosystem, they are seen exchanging the borrowed,

GOBIND SAGAR BHARDWAJ

patterned shells they have outgrown. Usually standing in a file of 'size order', larger crabs pass on their shells to the smaller ones. Few groups of crabs, more chaotic than the ones that queue up, create a tiny traffic jam on the beach. At this time, these soft-bodied crustaceans feel the most vulnerable as they scurry to find fitting, new shells for protection. Scientists call this hierarchical shell exchange a 'vacancy chain'. Similar sized crabs often combat for a single shell, and their existing shells create clunking sounds when they hit each other. If alert enough, one can also see ghost crabs that casually camouflage with the sand, disappearing at the slightest movement, and reappearing to make the sand look like it is moving on its own. Both the crabs are predominantly active at night, only to retire by sunrise.

Within a few minutes, Nicobar long-tailed macaques, the second largest mammals on Great Nicobar (after the wild pig), get active. Living in groups of different sizes, these primates are found on the coast, in the forest and near urban settlements. They feed on a varied diet of pandanus, coconuts, rhino beetles and fruits such as *jaiphal* and papaya. When a morsel is too thorny or muddy, they perform an interesting 'leaf wrapping' behaviour. They look for the nearest bush and haphazardly cover and rub the food with the bush or with a single plucked leaf as if wiping it before consumption. These superstars are particular about grooming. They even seem to floss their teeth with slender casuarina twigs or similar material after feasting!

Later in the day, White-nest Swiftlets, Racket-tailed Drongos, Crimson Sunbirds and water birds such as the Water Cock and the Pond Heron are seen carrying out different tasks. While some are better individual workers, others chatter in groups, like a synchronous choir in the play. Some are seen around Campbell Bay, the main human-inhabited part of the island. Others are spotted in coastal forests such as the one in Galathea Bay or the Great Nicobar Biosphere Reserve. Among the birds living in coastal forests, the undisputed show stopper is the endemic Nicobar Megapode ('megapode' translates to 'big feet').

ABOVE *Hermit crabs are decapod crustaceans, with a soft abdomen unlike other crustaceans. They are well known for their behaviour of occupying a discarded seashell to protect their soft abdomens.*

FACING PAGE *A brain coral is juxtaposed against a colourful sunset on the Nicobar shore. The forest, the shore, and the underwater are the three main "play acts" for Great Nicobar, with various creatures taking centre stage during different times of the day.*

These brown birds somewhat resemble chickens. They build mounds like ingenious architects, carefully picking a tree that will support their elaborate constructions. Unlike other birds, megapodes do not incubate their eggs to regulate their temperature (around 33°C). Incubation relies instead upon the decomposition of dried leaves and twigs that form the mound. Mother megapodes regularly check the temperature of the mound using thermometer-like feet, ensuring that their offspring are doing fine. The chicks are able to hunt, walk and fly on the day they emerge from their pinkish eggs!

Among the birds living in coastal forests, the undisputed show-stopper is the endemic Nicobar Megapode. They build mounds like ingenious carpenters, carefully picking a tree that will support their elaborate construction.

GOBIND SAGAR BHARDWAJ

RAVI SHANKAR P.

SAURAV HARIKUMAR

ABOVE *The Nicobar long-tailed macaque and Nicobar treeshrew are endemic to the Nicobar Islands. The former inhabits mangroves, coastal forests, as well as inland forests. The latter is a primarily arboreal mammal. It is omnivorous, and spends most of its time foraging. Both mammals are now facing habitat loss in addition to other existing threats on account of the denotification of the Galathea Bay Wildlife Sanctuary.*

The Nicobar Pigeon is another endemic species in Nicobar. Genetic analysis reveal they are the closest living relatives of the dodo, thus, looked upon as icons of morphological evolution. Sometimes, they appear in other plays with different backdrops too, as these pigeons are island hoppers. In fact, one of them is also known to have appeared all the way across the southern Indian Ocean on the shores of Australia! They have colourful iridescent feathers that shine brightly in the sunlight. This is a costume shared by the sunbeam snake, which is otherwise purplish-black. Light creates a rainbow effect on the snake's skin. The beautiful reticulate python, known for the perfectly geometrical patterns that cover its body, also occupies the same forest.

The Nicobar treeshrew is the star attraction in the forest scene. Performing stunning aerial stunts, these gifted gymnasts thrive in the dense rainforests as well as littoral patches on the islands of Little and Great Nicobar.

DYNAMIC ENSEMBLE Throughout the day and night, the act of the forests is quite the musical. The angry and calming tunes of the waves are not the only sounds one hears. Strong winds create a choir of pandanus leaves that sound like natural wind chimes or wooden sticks striking against each other, resembling a continuous, polite '*dandiya*'. A large flock of Glossy Starlings fly by, chattering away in their groups, ready to perch on the tallest tree they can find. Winds make the trees whisper to one another – perhaps about the rainfall patterns that they play a role in defining. The macaques make a variety of sounds from morning to early evening. They make sharp-chirpy sounds or raise alarm calls to alert group members of potential threats. The alpha male uses a *krackow* call to integrate scattered troop members just before they move to a roosting spot and call it a day. The young ones, unaffected by the alpha's command, continue their antics and resist their mothers' tugs (a slight argument ensuing, perhaps) just so they can play a little longer. These macaque moms are often seen relying on their older daughters and sisters to babysit their infants while they forage for food. Amidst the chaos of the macaques, bird calls are heard. Some even resemble a crying child at a distance. Despite spending a good amount of time in the dense thickets, it is difficult

to spot all the birds singing in their unique voices. A coarse cackling sound is followed by a gurgling one – like bubbles popping rapidly. Some bird calls even resemble a flowing stream. These melodious tunes are followed by a sharp whistle, accompanied by the singing of the cuckoo and the muffled buzzing of a wasp.

No play is complete without some adrenaline-pumping action. The Nicobar treeshrew, that looks much like a squirrel, is the star attraction in the forest scene. Performing stunning aerial stunts, these gifted gymnasts thrive in the dense rainforests as well as littoral patches on the islands of Little and Great Nicobar. They are often seen resting comfortably around branches below vine-covered canopies or sub-canopies with their tails curled towards their bodies. At other times, adults and adolescents are seen squabbling on branches – either in pairs or in groups of four or five. Another interesting crustacean is the giant coconut crab, also known as the robber crab (*Sanctuary* Vol. XII No. 1, February 1992). Terrestrial creatures, they possess a very well-developed sense of smell. Being scavengers, they eat virtually anything left unattended – thus the title 'robbers' or 'thieves'. The coconut crab is also called so because of their nocturnal habit of using their pincers to dig into coconuts.

The trees in the forests on the island have claimed their own spaces, but also share them with woody and soft green climbers that look like they are hugging them. These climbers form interesting shapes – checkered designs and helical structures that resemble DNA. Some trees have stilt roots and form natural swings in the forests, often occupied by a pair of amorous birds. The trees are tall, and the forest floor appears like a racetrack on which trees compete to see which grows the tallest. The thickness of the rainforest leaves little space for light penetration to the ground, leaving the forest floor dark and dim. Together with moistness, this encourages the growth of different varieties of mushroom – some white, others black, red or brown. Wherever shafts of light negotiate their way through the thick canopy, an ethereal glow illuminates the leaves and branches. At night, biofluorescent mushrooms and bioluminescent fireflies resemble sparkling diamonds as they light up the forest wonderland!

ANOTHER SETTING Back on shore, the sea is as active during the day as it is at night. When the waves hit the shore, at several places on the beach, corals are deposited instead of shells. They are statements of beauty unto themselves, characterised by the Golden Ratio and the Fibonacci sequence patterns they carry (some branching, others laminar and columnar), making a nature artist yearn to sit on the sweltering sand and sketch them. Adding to the beauty, acorn barnacles form curtain-like geometric patterns on rocks and moist trunks. The quiet horizon suddenly comes to life when a pod of dolphins passes by, cheerfully playing with one another, or competing with the waves by leaping higher every time. Making a much-awaited special appearance in the play are flying fish, the enigmatic stars of the open sea that grab all attention by staying true to their name. Then there are the saltwater crocodiles, which, like stately patriarchs of a period film, silently guard the estuaries and freshwater streams of the island.

Back on the shore as night begins to fall, stars begin their magic. Not marred by light pollution, the stars in the island sky are clearly visible, glittering unhidden by clouds that carry rain. Sometimes the sky bears a tinge of pink too, with the appearance of the Milky Way. Bioluminescent zooplankton are visible in the water when waves touch the sand. The imagery is that of stars having fallen into the ocean –

SAURAV HARIKUMAR

ABOVE *Acorn barnacle is the common name for a number of stalkless species of barnacles. They belong to the same order Crustacea as crabs and lobsters, but are sessile (nonmobile) as adults, growing their shells directly on the substrate.*

quite elusively, letting spectators catch a mere glimpse. Nights are usually when mother leatherbacks or olive ridley turtles emerge, ready to lay their eggs in the fine sand. The same night also sees tiny turtle hatchlings emerge from other nests... all bite-sized temptations for water monitor lizards, wild pigs and dogs that lie in wait.

The Great Nicobar Biosphere Reserve and the recently de-notified Galathea Wildlife Sanctuary together extend over land and all the way into the coastal waters. The rich seas surround the dense forests of the island, giving rise to distinct ecosystems that house several endemic species. Every square centimetre of the island hosts a variety of organisms – so dense, that each tries to claim its own space. All lifeforms play their own special roles, each more interesting and critical as the other.

Yet, because of limited research, we have thus far discovered all too little about the living wonders of these magical isles. We know a mere handful of the actors, directors, and sound and light managers of the spectacle. The dynamism and enigma of this unique island has a strange coherence to it, making the Great Nicobar production a thrilling, yet calming one, exclusive to this island.

And this show must go on!

S. Jalihal graduated with a degree in Environmental Studies and Public Policy from FLAME University, Pune. She is interested in studying different ecosystems around India and currently works at the Centre for Knowledge Alternatives, FLAME University. In her free time, she likes to paint the biodiversity she sees around her.

The corals and shells are statements of beauty themselves, characterised by the Golden Ratio and the Fibonacci sequence patterns they carry, making a nature artist yearn to sit on the sweltering sand and sketch them.

Exploring the Bats of Nicobar

Photographs and Text by Bandana Aul Arora

In the world I grew up in, dolls were more of an interest for young girls, but even as a child I was more interested in exploring the outdoors. The first time I heard the roar of a tiger, in a zoo, stirred something in me. I just had to look for one in the wild and thus began my fascination for the Felidae, particularly the big cats. In 2001, I travelled to the Nicobar Islands as part of my Master's degree and was tasked with the challenge of locating and studying the bats of the mysterious islands. I could find no one who had studied bats here before, and my focus thus shifted from cats to bats!

I have, of course, often been asked why I chose to study bats. Depending on my mood, my answers have varied from "Because bats hang upside and look at life from the right perspective," to "I am not a morning person, so I chose a nocturnal species." Truth be told, I have long held a fascination for caves and have always been interested in delving into the obscure. My first experience of caves was in the Rutland Island, South Andaman, along with Dr. Ravi Sankaran and *Sanctuary*'s editor, Bittu Sahgal, wherein as a novice, I was denied entry into the caves. I made a promise to myself that one day, I would explore them all! Today, I can confidently say that I kept that promise; I have surveyed more than 300 caves in the Andaman and Nicobar Islands.

My pioneer survey of the bats of the Nicobar Islands resulted in the rediscovery (after more than a century) of the only endemic solitary roosting Pteropus faunulus.

THE BATTING LIFE My adventurous, memorable and often challenging work in the Nicobar Islands began at the southernmost tip – the Great Nicobar Island (GNI) – in 2002. A three-day journey of 528 km. by ship was the only mode of travel to the islands then. All travel begins early in the morning as the tides across the 10-degree channel are not navigable later in the day. The ship travels from Port Blair via Hut Bay (Little Andaman), Car Nicobar, Tressa (pronounced as *Taa-rasa*), Kamorta and then we would make landfall at Campbell Bay. While travelling, we would joke about landing a little south in the islands of Sumatra and being deported back to India – that would have been one easy plane ride back home! At that time, communication was by snail mail, via letters, and an occasional phone call courtesy a vintage pay phone booth (if the owner was not asleep by the time you came back from your field trip). There were no mobile phones... no connectivity at all.

I remember the first of my trips. My assistant, Saw Johnny and I, reached Campbell Bay and checked into the forest house with a friend. Almost immediately, I felt like I had arrived at my second home. Working on the remote island somehow always seemed secure. I spent a

ABOVE *The lesser short-nosed fruit bat* Cynopterus brachyotis *is a frugivorous bat found in South and Southeast Asia.*

FACING PAGE *During her studies, the author came across an orphaned juvenile black-eared flying fox* Pteropus melanotus*, found only in Andaman, Nicobar and Sumatra.*

Great Nicobar Island

Islands seem to have it all: ample sunshine, white sand beaches, and species you can't find anywhere else on Earth. Since Charles Darwin first traveled to the Galápagos Islands and British naturalist Alfred Russel Wallace to the Malay Archipelago in the mid-19th century, ecologists have believed there is something special about islands. A new study provides some of the first empirical evidence that island biodiversity really is different from that of the mainland.
– Carrie Arnold, in ScienceNOW

Most of Great Nicobar is designated as a biosphere reserve. The biosphere reserve incorporates two national parks, which were gazetted in 1992. Campbell Bay National Park on the northern part of the island and Galathea Bay in the southern interior are well known as traditional nesting places for giant leatherback turtles. In 2013, it was included in UNESCO's Man and Biosphere Programme to promote sustainable development. The Great Nicobar Biosphere Reserve harbours a wide spectrum of ecosystems comprising tropical wet evergreen forests, mountain ranges, and coastal plains. The region has recorded a host of ecologically important species of flora and fauna, including angiosperms, ferns, gymnosperms, bryophytes and lichens, among others. The area fosters several rare and endemic species, including the crab-eating macaque, Nicobar treeshrew, dugong, Nicobar Megapode, Nicobar Serpent Eagle, saltwater crocodile, marine turtles and the reticulated python, which are/or might be endangered (there is a lack of sufficient data). Bats have not been included in the list, as there has been no work done on them in the past. Much of the existing information on bats in the Andaman and Nicobar Islands was restricted to sporadic surveys and mere chance encounters.

While our work contributed to some extent, conservation in the islands cannot be initiated to its full impact until most of the species are documented and their habitats are recorded and mapped. A striking example is when we were able to document the Nicobar Scops Owl *Otus alius* on a bat sampling night, which had not been photographed before.

lot of time in the mangroves and the jungles. The islanders never made me feel 'unsafe', even in the initial days, when they did not know me, thanks to the tribal ethos that fosters a genuine respect for women. I cannot imagine feeling as safe and free working almost anywhere else.

The Forest Department officials and islanders were equally courteous. Being the only woman researcher on the islands, I got extra support from them and after they saw us working through the night to protect their forests, the association between us grew strong and they would then go out of their way to make me feel at home. The Gol Ghars (round-shaped family houses on stilts) were opened up for me; they would place guards for my field trips to the interiors of the islands, especially when my work took me to Kopenheat (the Western border of Great Nicobar Island), as it goes through the East-West Road from Campbell Bay – via the *Shompen* Hut. When we were out for weeks in the forest, the islanders would call my mother and tell her that all was well with me. Often on returning, I would learn of multiple calls made to my mother from the island, as most of them assumed the duty to ensure that my parents would sleep in peace.

Prior to my arrival on the islands, the effort to systematically map the bat fauna in the bay islands had never been attempted. I successfully documented 17 species in the Andaman group and 12 in the Nicobar group. Whilst recording species and ecological information on the roosting habitats, diet and threats faced by bats, we also recorded severe pressure on their populations on account of habitat degradation and change, human settlements, introduction of exotics and enhanced activity in the islands.

Prior to my arrival on the islands, the effort to systematically map the bat fauna in the bay islands had never been attempted. I was successful in documenting 17 species in the Andaman group and 12 species in the Nicobar group.

Megabats of Great Nicobar

Pteropus melanotus: This medium-sized fruit bat is the largest species of bat, weighing around 619.8 g. The pelage is dark brown to blackish brown, with paler hair sometimes giving it a grizzled appearance. The back and rump are blackish, sprinkled with a few grey hair. The mantle is rufous in males and lesser or absent in females. The day roosts have a dominant habitat in the mangrove creeks and the fronds of nypa palms. *Pteropus melanotus* (n>500) was found to be roosting in *Nypa fruticans* palm fronds primarily, with a minimum of 10-15 bats on a single plant. The colony in Great Nicobar Island (n>300) was initially located at the head of the creek but frequent human intervention has forced them to the interiors of the creek.

Cynopterus brachyotis: A small fruit bat weighing 56.9 g. The white margins bordering the ear are very prominent and run all along the ear uniformly. It is the most widely and commonly occurring bat across all habitats on the islands. This species is found in several different habitats, mainly mangrove fringes, dry evergreen forests, human habitation and evergreen forests. The bats were particularly observed to frequently visit fruit plantations and in some areas were reported to be damaging to the plantations. They are often seen to roost under the leaves of coconut trees by making tents either in groups or solitarily. They are voracious foragers and begin foraging early in the evening and continue until dawn. A distinct *click - click* sound can be heard while they move from tree to tree for foraging.

ABOVE *A view of Campbell Bay in Great Nicobar. The author surveyed Great Nicobar, Little Nicobar, Kondul and the Pulo Milo islands. She followed up her work in Central Nicobar comprising eight islands, Nancowrie, Kamorta, Katchal, Trinket, Tressa, Bompuka, Chowra, and Tillangchong, and then moved to northern Nicobar comprising the Car Nicobar Islands.*

FACING PAGE TOP *A lesser short-nosed fruit bat pup hangs on to its mother's belly. Bat mothers routinely carry their pups, almost one third their own weight, while the pups cling to her underarm nipple and hold on to her waist with their toes.*

FACING PAGE BOTTOM *The author recorded 12 bat species from the Nicobars including* Myotis dryas *of family* Vespertilionidae.

If endemic flying foxes go extinct, no amount of reintroduction efforts will succeed because this species shares a unique interdependence with the islands' flora and fauna. No other part of the world possesses this.

DUMMY DUMMY

As my work progressed, south of the 10-degree channel in the Nicobar Islands, I commenced the survey from GNI. It took me six years to map the habitat and distribution of bat fauna of the 24 islands that formed the archipelago.

DESTINATION GREAT NICOBAR My survey of the bats of the Nicobar Islands resulted in interesting data. This included the rediscovery of the only endemic, solitary roosting *Pteropus faunulus*, and a medium-sized flying fox *Myotis horsfeildii dryas*. *Murina cyclotis* was also reported for the first time in Great Nicobar. This is a new range for records of bat species in these islands.

By 2007, I had completed my survey in the southern Nicobar group, comprising Great Nicobar, Little Nicobar, Kondul and the Pulo Milo islands. I then followed by working in Central Nicobar comprising eight islands, Nancowrie, Kamorta, Katchal, Trinket, Tressa, Bompuka, Chowra, and Tillangchong. And then moved to northern Nicobar comprising the Car Nicobar Islands.

I largely explored Great Nicobar on foot, with Johnny, my field assistant, who helped me lug camera, data books and sampling equipment. We shuttled between islands using a small boat, called a *dungi.* Initially, we had to *hitch-hike* with the local fishermen until we got one for ourselves. Once, on an early and rainy morning,

ABOVE *A monitor lizard climbs the steep walls of a cave in seacrch of some* Hipposideros *species bats.*

BELOW *The author and her team take a much needed break during field work in the Nicobars.*

The Classification of Bats

Interestingly, the classification of bats into the order Microchiroptera and Megachiroptera is not based on size! Some microbats are actually larger than the fruit-eating megabats. Microbats primarily use larynx echolocation for navigation and to find prey. The one exception is the Egyptian fruit bat, which uses a type of echolocation by clicking its tongue.

The Microchiroptera or insectivorous bats in the islands are poorly described in past literature of the islands. A total of 12 species of bats belonging to eight genera and four families from the Nicobar Islands have now been recorded. A majority (75 per cent) of the bat species belong to the sub-order Microchiroptera. Leaf-nosed microbats are represented by two cryptic species – *Hipposideros ater nicobarulae* and *Hipposideros pomona*. Both are small bats and occupy caves and road culverts or abandoned buildings. These are difficult to distinguish and only morphometric data marginally separate them along with their occupancy in separate areas with no overlay together. The caves – the most important roosting habitats for bats, are also inhabited by Edible Nest Swiftlets *Collocalia fuciphagus*, which make them susceptible to disturbance as the nest is of economic value.

Megachiroptera on the other hand is represented by three species, namely *Cynopterus brachyotis* and the endemic *Pteropus faunulus*, restricted to the Central Nicobar Islands. and *Pteropus melnotus* is restricted to mangrove forests in Great Nicobar and other islands in the Nicobar Islands.

The Island Tale

Great Nicobar is the largest island in the Nicobar group and is inhabited by two Indigenous tribes, the *Shompen* and *Nicobarese*. The *Shompen* tribes live in the dense interior parts of the reserve forest, leading a semi-nomadic life and are restricted to Great Nicobar. They are hunter gatherer tribes and maintain limited contact with the outside world. The *Nicobarese* on the other hand have settled in all the islands in the Nicobar group. They are coastal dwellers who subsist on coconut plantations. A local legend about bats was that once upon a time, an old lady was unwell and the cold weather was making it worse for her to survive. A well-wisher offered the lady his blanket to keep her warm. Eventually, the days grew warmer, but by now, the blanket had become a part of the lady's back. Feeling unattractive with the blanket stuck to her back, the lady began to only venture out at night, when everyone was fast asleep. Till date, she roams and protects the forests at night.

Microbats in the Great Nicobar Island and Their Habitats

Taphozous melanopogon: cave dwelling
Hipposideros pomona: caves, abandoned buildings
Hipposideros ater nicobarulae: caves and culverts
Myotis horsfieldii dryas (endemic): roosting site not found
Murina cyclotis (newly recorded): roosts in foliage

we hitchhiked to Kondul island from Campbell Bay with the local fishermen. At night, I dreamt of white elephants, and the islanders said it meant that there will be more rain. Lo and behold... it rained continuously all the seven days we were there. No bat-related work got done! But we did swim into the sea-shore caves in Kondul and found *Taphozous* sp inside. A week later it was time to head back to Campbell Bay in the same *dungi*. Sensing my disappointment, the local fishermen kindly promised to take me there again when it wasn't raining.

Needless to add, I returned to the Islands several times. One of my favourite flying mammal study groups were the microbats (Microchiroptera) (see box above).

ABOVE Sanctuary's *Editor Bittu Sahgal with the author during her survey of bats in the Nicobar Islands.*

PROTECTING BATS OF GREAT NICOBAR

Anthropogenic factors are, sadly, poised to rob the islands of their unique, under studied, sensitive and irreplaceable ecosystem, which evolved over millions of years. Take the example of endemic flying foxes on the islands. If they go extinct, no amount of reintroduction efforts will succeed because this species shares a unique interdependence with the islands' flora and fauna. No other part of the world possesses this and we have not even scratched the surface of research required to document the islands' biodiversity.

The primary threat to bats, wherever they are found, is roost disturbance and habitat degradation. Some instances of hunting by locals does take place. But community-led initiatives to monitor foraging sites and roosting sites near human-occupied areas helps. And, when combined with more frequent and rigorous scientific research, we are beginning to understand the immense ecological services these oft-maligned mammals offer. A ban on any hunting by working together with the community to mitigate threats to cave systems and other roosting sites needs to be prioritised. But these days, we hear of several developmental projects planned for the Great Nicobar and I worry that we could lose species even before they have been fully studied. Some reports suggest that over a million trees might be felled. Irrespective of any mitigation steps suggested, being an island, this cannot bode well for bats, or virtually any other species on the Great Nicobar Island because the vast bulk of extinctions that have taken place in the past centuries have, you guessed it, been on islands that offered species in distress no retreat.

ASEEM KOTHIALA

WINGS OF GREAT NICOBAR

MEMOIRS OF A BIRDER'S JOURNEY

By Uday Mondal

Being an islander (born and raised in North Andaman Island), I am fortunate to experience the magnificence of Great Nicobar, where I also lived and worked for over three years. The morning of July 27, 2019, is etched in my memory – a large, purplish-grey bird, that was about to fly from a concrete structure submerged in the sea, caught my eye. I was intrigued and sought to identify it. The Purple Heron marked my first record on the eBird website, a global database for bird sightings. It's been a few years since I have moved out of Great Nicobar, but the time I spent birding there is truly special.

Several low-lying coastal settlements turned into wetlands post-tsunami in 2004, leaving behind concrete structures such as the one in the Jogindernagar settlement. In the early hours, the shores here are busy with groups of Lesser Sand Plovers and Common Sandpipers seeking food. There is a small patch of wetland surrounding a sandbar here. I spent hours exploring this area. During high tide, parts of this sandbar would submerge, bringing a fresh lease of life from the sea. Little water puddles received impatient schools of fishes. There were tiny islets in between, one of which would play host to about 30-40 Pacific Golden Plovers. As I tried to observe the plovers' activities, my focus was often disrupted by the sharp whistling of Greater Racket-tailed Drongos interspersed with the shrill chirps of Common Redshanks. My birding trips left me feeling fulfilled and brimming with joy. Soon they stretched to several hours as I began observing bird behaviour, such as interspecies interactions. I once saw a group of Black-naped Terns chasing an Osprey from the vicinity of

GOBIND SAGAR BHARDWAJ

ABOVE *A large, black and white bird, the Pied Imperial Pigeon* Ducula bicolour *mostly inhabits coastal forests on offshore islands. In the Nicobar Islands, it is usually found near human settlements.*

FACING PAGE *The Nicobar Megapode* Megapodius nicobariensis *is endemic to the Nicobar Islands. A shy and secretive bird, the megapode builds a mound using sandy soil and dry leaves to lay its eggs. The rotting vegetation provides the required incubation.*

their nesting colony, lessons in parental care and collective cooperation unfolding before me. Another time, I saw a Collared Kingfisher strategically perched on a reed, while appearing to plan a strike. Seconds later, I saw the kingfisher strike, diving into a barely perceptible ripple and shortly after, emerging with a tiny fish. The bird jerked its head to weaken the fish before swallowing it whole, leaving me curious about prey-predator interactions and how they shape species – one adapting to escape and the other evolving to hunt. No classroom lecture could ever match the lessons this island has taught me about the natural world; gradually revealing the lives of its mysterious creatures to build my curiosity and carefully concealing enough details that would compel me to go back and read about what I had just witnessed!

UNCOVERING LAYERS As I became more familiar with the spots where a variety of birds congregated, I began noticing that some birds are more commonly seen than others. For example, the Pied Imperial Pigeon is found near settlements (revenue areas), and Glossy Starlings often occupy long, bare, and semi-submerged logs. This space is also shared by non-native birds, which were introduced to the island, such as the Blue Rock Pigeon, the Common Myna and the House Crow. It is deeply worrisome to spot them as they might outcompete native birds and become invasive. There are reports of House Crow sightings from as far south as Galathea Bay. Other commonly seen native birds around human settlements include the Common Hill Myna and the Nicobar Long-tailed Parakeet while the Nicobar Parakeet, the Black-naped Oriole and the Andaman Green Pigeon are seen along the

GOBIND SAGAR BHARDWAJ

GOBIND SAGAR BHARDWAJ

TOP LEFT *The White-collared Kingfisher* Todiramphus chloris *is a tree kingfisher of the subfamily* Halcyoninae. *Its preferred habitats range from coastal areas, particularly mangrove swamps, open woodland, grassland to farmlands and inland forests.*

BOTTOM LEFT *An emerald green bird, with a brown head, and a crimson belly, the Hooded Pitta (Nicobar)* Pitta sordida abbotti *shyly hops on the forest floor to forage for invertebrates. Currently, there are 12 recognised subspecies including the Nicobar subspecies. However, further research is required to understand species limits.*

Avian Heritage

Great Nicobar, along with other Nicobar Islands, is part of the Sundaland Biodiversity Hotspot, one of only four Biodiversity Hotspots in India. Interestingly, the Andaman group of islands comes under the Indo-Burma Biodiversity Hotspot, indicative of the differences in the forest and the faunal assemblages between the two island groups, geologically separated by the 10-degree channel. Great Nicobar appears in the list of AZE (Alliance for Zero Extinction) sites and harbours areas such as Galathea Bay and Indira Point under the 'Global Safety Net (2020)', that if protected can 'halt the dual crises of biodiversity loss and climate change'. The Nicobar Islands are also one among the 27 major Endemic Bird Areas (EBAs) in Asia. Great Nicobar is an Important Bird Area (IN451) that is classified under A1 (holding significant numbers of globally threatened species) and A2 (holding a significant population of at least two range-restricted species) categories.

forest edge. The latter are primarily found in lowland forests and their collective calls resemble a melodious orchestra. Yet, other birds are difficult to spot within the thick and dark vegetation. Once, I was able to hide behind a tall, bushy fern from where I sighted a little creature hopping under the shade of a tree. When light fell on it, I could see its emerald green body, brown head, and a crimson belly. I instantly knew it was the Hooded Pitta. Another time, while I walked through a forest trail within the Great Nicobar Biosphere Reserve, the rustling of dried leaves alerted an Emerald Dove that attempted a clumsy escape by flapping its wings and moments later, I saw its shadow drift across the forest.

The south-eastern coast of Great Nicobar has a substantial number of wetlands over a single stretch. The area where the Campbell Bay wetland is situated is called Murdakhadi (which means 'bay of the dead'), a name it gets from the graveyard situated next to it. The wetland is home to a large population of White Egrets and Pacific Reef Herons. Their mild howls are heard when the sea breeze blows through the littoral vegetation. Hundreds of migratory waterbirds and shorebirds can be found all across the wetlands situated in the villages of Govindnagar and Gandhinagar. In addition to the large congregations of plovers and sand pipers, a few individuals of the Terek Sandpiper, Oriental Pratincole, Sanderling, Ruddy Turnstone, Brown Noddy, Richard's Pipit, and Lanceolated Warbler species can also be sighted.

As the sun sets and darkness envelops the island, the forest resonates with the calls of nocturnal creatures such as the

SAGAR RAJPURKAR

ABOVE *Several low-lying coastal settlements turned into wetlands post-tsunami in 2004, where the author has observed waders such as Lesser Sand Plovers* Charadrius mongolus *and Common Sandpipers* Actitis hypoleucos *seeking food.*

Nicobar Scops Owl, Brown Boobook and Grey Nightjar. The Nicobar Scops Owl is highly territorial and with its habitat curtailed severely, only a handful of these can be found in the settlement area of Govindnagar. The Grey Nightjar is a winter visitor to the island and hard to spot until its distinctive call can be heard. When one is attentive, a continuous, electronic *too-too-too-too* sound... can be traced to this expert acrobat flying up and down in the paddy fields of Govindnagar.

UNSETTLING BIRDING NEWS On December 13, 2019, as I was sipping my tea in the evening, I noticed a large flock of Asian Openbill Storks gliding towards the islands. Two bird flyways pass over the island, the East Australasian Flyway (EAAF) and the Central Asian Flyway (CAF), which explains why the lush vegetation and the rich wetlands of Great Nicobar are a favourite resting spot for several migratory birds. On the following day, I was eager to catch a glimpse of the latest arrivals. As I packed my belongings, I received a call from a local journalist. He told me that hundreds of carcasses of these storks had been discovered along Gandhinagar's coast, and more were washing up. I realised that the intense fire that had broken out in Indonesia's palm plantations may have caused these fatalities. My excitement quickly turned into deep sorrow. Understanding the natural world in Great Nicobar often leaves one with a bitter-sweet feeling.

Despite my long stay at Great Nicobar, and several well-planned birding trips, the Nicobar Megapode – the oldest genetic stock of the megapode family – has still eluded me. These mound-building birds are master architects – they use a mix of sandy soil and dry leaves to incubate their eggs. They often build mounds near old and decaying trees. Depending on mound depth, the journey of a hatchling from the bottom of the mound is slow (taking up to 3.5 days), precarious and deadly. Megapode calls are most frequently heard at dawn and dusk. During one such occasion, while on a survey at the Jogindernagar forest, I could even hear their echoing calls... *kyouououou... kyououou...* resonating through the forest. I continue to cherish memories of that expedition, walking tirelessly through the wet forest and being troubled by mosquitoes and leeches. As sought after and celebrated by the birdwatching community as it is, the Nicobar Megapode (see page 41) is also equally vulnerable. In 1997, there was an outbreak of avian cholera in the domestic fowl of Great Nicobar, the symptoms of which were also seen in the megapodes. The outbreak ended up killing over 50 per cent of the fowl. There is no record of what happened to the infected megapodes.

My desire to see the megapodes continues to remain strong, and I long to return to Great Nicobar. The recently denotified Galathea Bay Wildlife Sanctuary is still a hopeful location to spot this endangered bird, as their continuous calls echo through the area. However, there are justified concerns regarding the impacts of the megaprojects on the island, and I hope to visit before any major changes take place. My memory of birding on this island is like a constellation of stars in my imagination, with a vacant spot where the luminous moon should be – the Nicobar Megapode is that moon. With over 51 active megapode nests in the area of the now-approved megaproject, 30 of them will be permanently destroyed on account of construction activities. A sad realisation has engulfed me with anxiety that my vacant spot may never be filled.

Diverse Ecosystems

The Andaman and Nicobar Islands are an archipelago consisting of about 572 islands in the Bay of Bengal, quite far (about 1,350 km.) from mainland India. With a landmass of 8,249 sq. km. and a coastline of 1,962 km., the islands stretch from the south of Myanmar to the north of Sumatra, representing diverse ecosystems found nowhere else on the planet. The evergreen and littoral forests, mangroves, marshy wetlands and fringing coral reefs are some of the critical ecosystems in the islands, which, when coupled with an undulating topography, heavy rainfall and a highly humid climate, make home for some of the most unique and incredible flora and fauna.

VIKAS NAIRI

IMAGE FOR REPRESENTATIONAL PURPOSES

THE CETACEAN BEAUTIES OF GREAT NICOBAR

By Mahi Mankeshwar

Beauty lies in the eye of the beholder and for me, it lies in the shape of the seafloor of the Andaman and Nicobar Islands. For if, from the water's surface, our eyes could peer deep into the island's waters, we would find ourselves floating over summits of a mountain range sprawled beneath us! Beginning high up in the eastern Himalaya to the north, these mountains stretch over 1,000 km. southwards, hemming off the Bay of Bengal to the west and nestling in the Andaman Sea to the east.

What initially drew me to the Andaman and Nicobar Islands was not so much the submerged mountains but the possibility of learning more about a group of animals known as cetaceans... dolphins and whales. These are arguably one of the most charismatic animals in the animal kingdom, yet we know so little about them from our waters.

When it came to the islands, we knew even less. And so, one of the first questions I asked when I first arrived on the islands as a researcher in 2016 was, "Are there dolphins and whales in these waters"? The more I talked to island folk and the more we observed the sea with binocular-equipped eyes, the canvas of the waters began to fill up. First, with the languid swims of bottlenose dolphins, then with the most energetic breaches by spinner dolphins, and then with curious orcas ambling around a fishing boat. One by one, through old photos shared by people and new sightings made from our ferries and boats, we learnt that there are at least 15 species in these waters including Omura's

whales, sperm whales and other deep-sea species such as the Fraser's dolphin and the dwarf sperm whale.

Between the deep, yet vastly homogenous stretches of the Bay of Bengal and the Andaman Sea, these islands seem to offer a refuge to oceanic species. Whether it's the steep ridges that give way to depths thousands of kilometres below sea level, or seamounts and pinnacles that are magnets of diversity, or the shallow waters off a beach, they all are nooks offered by the mountains that the animals keep returning to – making the island system a haven for cetacean diversity.

CETACEANS AND THE GREAT NICOBAR ISLAND

The Great Nicobar Island (GNI) at the southernmost tip of the island chain is very much a part of the same underwater mountain range more scientifically known as the Andaman and Nicobar Accretionary Ridge (ANAR). Yet, the EIA report for

ABOVE *A boat ride around Great Nicobar Island offers a fair chance of sighting a hyperactive pod of spinner dolphins* Stenella longirostris. *These were not documented in the EIA report for the Great Nicobar 'development' project.*

Between the deep, yet vastly homogenous stretches of the Bay of Bengal and the Andaman Sea, these islands seem to offer a refuge to these oceanic cetacean species.

MAHI MANKESHWAR

AKSHATA KARNIK

ABOVE *The false killer whale* Pseudorca crassidens *is a highly social species of oceanic dolphin. The name 'false killer whale' comes from having a skull similar to the orca* Orcinus orca*, or killer whale.*

FACING PAGE TOP *Omura's whale* Balaenoptera omurai *is a rare species of rorqual, of which there has been limited sightings and natural history data.*

FACING PAGE BOTTOM *This large pod of Fraser's dolphins* Lagenodelphis hosei *was spotted in the waters off Nicobar Islands. This deep-sea species feeds on pelagic fish, squid and shrimp at depths where sunlight does not penetrate.*

the Great Nicobar Island's 'development' project documented only three marine mammal species from the area, one of which is the dugong, which is not a cetacean! This hardly came as a surprise as EIAs have often been nothing but facilitators for such projects in the past.

What kind of diversity do we really have in the waters of Great Nicobar? Frankly, we do not know enough. Unlike humans, dolphins and whales are free of the name-place mental barrier and to them, Andaman and Nicobar are part of the same seascape as their usual haunts, with thankfully no one asking them to furnish a pass or permit... at least, not yet!

All the cetaceans we found during the study in the Andaman Islands, with the exception of the bottlenose dolphin and Omura's whale, were oceanic species. These are free-ranging and quite boundless in their movements, most often in pursuit of fish and squid. So even though they may show preference to certain areas, they also often make lengthy migrations, which may cover an entire sea or ocean basin.

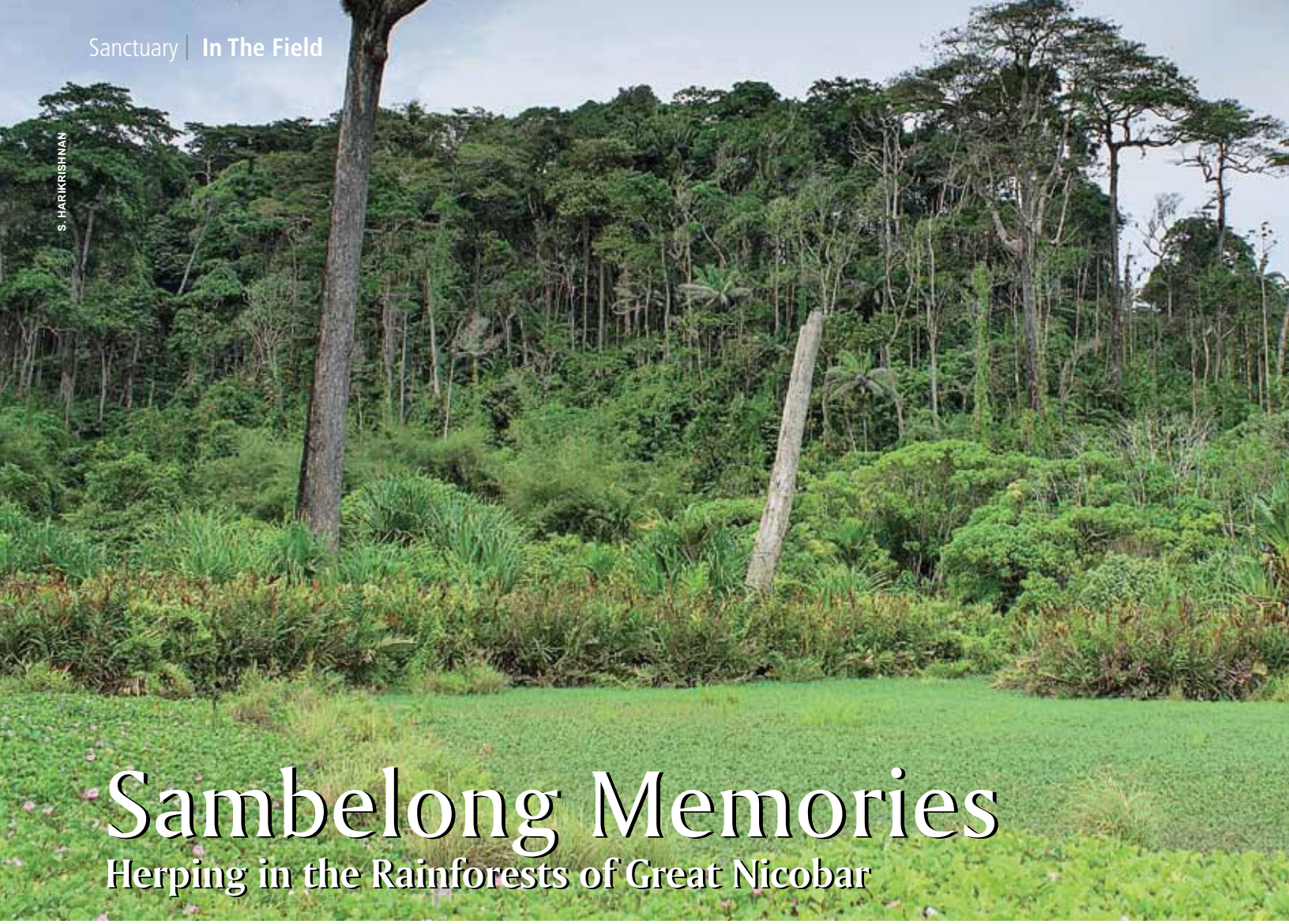
But, if you still do not want to leave it to speculation, take a couple of walks on B-quarry beach in Great Nicobar and you will surely witness the slow-swimming fin of a bottlenose dolphin pierce through the surface of the water. A species that was not documented in the EIA but stands to lose much of its habitat given its preference for shallow coastal waters, just like the dugong. Or take a boat ride around the islands and chances are you will be greeted by a hyperactive pod of spinner dolphins or the pantropical spotted dolphins. Add to this list, beautiful drone footage of Omura's whale, captured by a fellow researcher from the waters off Little Nicobar, an island just north of Great Nicobar. The orca and Risso's dolphin have also made their presence felt in these waters.

Sadly, none of these animals were recognised in the EIA report. Cetaceans have been accoladed Schedule I status, making them eligible for the highest protection by Indian law, and if that was not enough, part of the southern Andaman islands has been internationally identified as Important Marine Mammal Areas (IMMAs). But, as has been the case thus far with marine mammals of Great Nicobar, as with so many other species, it will be difficult to protect something whose existence has barely been officially acknowledged.

After exploring the waters of Andamans, it was always Great Nicobar I wanted to return to. Given their remote and relatively undisturbed status, this island has always had the potential of revealing a lot more to us than is already known. Besides the desire and curiosity to find which species of cetaceans live there, I have also been interested in understanding how different species interact with their habitat. Which of the many nooks offered by these majestic underwater mountains do different species most depend on and why? What role do they play in their life histories at different times of the year? These are the questions that need to be answered before we decide to permanently alter a habitat.

If we knew the answers, we would be very unlikely to condemn these habitats and their inhabitants for short term financial gains through poorly conceived projects... in the name of development.

The EIA report for the Great Nicobar Island's 'development' project documented only three marine mammal species from the area, one of which is the dugong, which is not a cetacean! This hardly came as a surprise as EIAs have often been nothing but facilitators for such projects in the past.



S. HARIKRISHNAN

Sambelong Memories

Herping in the Rainforests of Great Nicobar

Sambelong is the old name for the southern islands in the Nicobar archipelago. These islands are home to numerous endemic species, which thrive in the secrecy of dark forests, protected so far by the blissful absence of modern civilisation. If this rich ecosystem is disturbed and degraded, we stand to lose diverse species, some of which may not even have been recorded, says researcher and herpetologist **S. Harikrishnan.**

The torrential rain had subsided a little as Boudha Ram and I walked back from our night survey along the East-West Road in Great Nicobar Island. Torch lights illuminated frogs hopping across the broken road. There was much activity in this roadside pool. Most were chorus-calling, tiny Nicobar narrow-mouthed frogs *Microhyla nakkavaram*. A few Nicobar tree frogs *Polypedates insularis* were perched on bushes around the pool. Both species are endemic to these islands. We saw a couple of dark grey triangle-spotted keelback snakes *Xenochrophis trianguligerus*, one in the water and the other in the wet grass around the little pool, possibly hunting for frogs. As I turned away after taking a few photographs, my torchlight illuminated another large, dark snake on the far side of the road. It was moving slowly down the side of the hill. It was an unusually large triangle-spotted keelback, I thought, and as I moved closer, I expected it to turn and bolt back up into the bushes at any moment, the usual behaviour of keelbacks. Instead, this snake froze. I took a few more steps toward it, illuminating it well. To my surprise, instead of fleeing, the snake raised its head, throwing its body into deep s-shaped coils, puffing up its neck and slightly opening its mouth. The message in its loud hiss was clear: back off, I'm not a little water snake. Closer examination showed it to be an unknown member of the rat snake/racer group *Coelognathus* sp.

I first set foot on Great Nicobar Island on a rainy morning in May 2008. I was on a Wildlife Institute of India project, to survey and study the effects of the 2004 tsunami on the herpetofauna of these islands. Historically, islands have had a tendency to hook naturalists. My case was no different. I went to these islands for a one-year project with about six months of

ABOVE *The reptilian and amphibian fauna of the forests of the Nicobar Islands are not only different from mainland fauna, but also abundant. Many species also have island-specific adaptions different from other populations.*

field surveys, but ended up spending most of the next six years travelling the islands. There were many things about the reptile and amphibian fauna here that roused my curiosity. Yes, they were different from mainland Indian fauna, but I was also struck by how abundant animals were in the forests of the Nicobar Islands. Groups of islands tended to have species unique to them, and many species were found only on one or two islands. Even the fairly widespread species seemed to have island-specific adaptations different from other populations. Millions of years of isolation from continents, repeated connections as well as breaks between groups of islands, have shaped their fauna. There were, and still are, many ecological and evolutionary phenomena to unpack here.

HERP PARADISE The largest and southernmost island in the Nicobar Archipelago, Great Nicobar Island, is a treasure trove of biodiversity. The island is home to exceptionally diverse and true rainforests, marked by rainfall almost throughout the year. A striking feature of most islands in the Nicobars is the abundance of venomous pit vipers. Five species of pit vipers occur in the northern and central groups of islands, where they are still common in the forests. However, Great Nicobar is an exception. The tall, mighty forests of Great Nicobar seem to have no venomous snakes: no vipers, no cobras and no kraits (not counting sea snakes and sea kraits). This is a highly unusual situation in an Asian rainforest! The closest to a venomous snake here is the large and beautiful Nicobar cat snake *Boiga wallachi*, which, as the name implies, is found nowhere else in the world. I frequently encountered this snake hunting for frogs at night in bushes surrounding pools. Locals told me that this snake often raids chicken cages in search of eggs. Another well-known chicken thief is the longest snake in the world, the reticulated python *Malayopython reticulatus*. On occasion, I spotted small individuals climbing up trees into the canopy, probably to hunt roosting birds and bats.

These forests also have an abundance of much smaller, equally beautiful critters found nowhere else in the world. Along the forest edges and up in the canopy, a ubiquitous sight is the bright green, well-camouflaged Daniel's forest lizard *Bronchocela danieli*. On sunny days, one could see males with their black and orange face masks displayed from tree trunks, head bobbing and performing push-ups to intimidate rival males and to attract females. They also keep a sharp eye out for predators, like the fast and slender Humayun's bronzeback tree snake

The Herpetofauna of Great Nicobar Island

There are 34 species of terrestrial amphibians and reptiles (not including the several species of sea snakes, sea turtles and salt water crocodiles) known from Great Nicobar Island. At least 15 of these are endemic to the Nicobar Islands, particularly to Great and Little Nicobar. Many of these were previously thought to be widespread species, but focused studies using modern tools have revealed them to be endemic to these islands. If this pattern holds true, more and more species are likely to be endemic to these islands than currently understood.

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ABOVE *The* 'tok-tok' *calls of the large, nocturnal Stoliczka's giant gecko* Gekko stoliczkai *can be heard from kilometres away. These bright blue-green eyed geckos live on large rainforest trees, often in pairs.*

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S. HARIKRISHNAN

ABOVE LEFT AND RIGHT *The red-eared frog* Hylarana erythraea *can be seen along forest edges and pools along the coastal littoral region while the Nicobar tree frog* Polypedatus insularis *is seen on trees and bushes. Coastal land subsidence and saltwater intrusion on account of the December 2004 tsunami impacted prime amphibian habitats such as wetlands and pools.*

Dendrelaphis humayuni. In the evenings, the '*tok-tok*' calls of the large, nocturnal Stoliczka's giant geckos *Gekko stoliczkai* could be heard from kilometres away. These foot-long geckos with bright blue-green eyes and a vice-like bite live on large rainforest trees, often in pairs. Down in the gloom of the understorey and leaf litter are other inhabitants. I often saw the slender Nicobar bent-toed gecko *Cyrtodactylus adleri* that rests during the day under leaf litter, climbing up on tree trunks and saplings at night. When spotted, they use their zebra-striped tails to distract would-be predators by wriggling it like a little worm. Foraging in leaf-litter and humus is a little brown snake, which reveals all the colours of the rainbow only when placed in bright light, earning it the name sunbeam snake *Xenopeltis unicolor*. The scales of this snake are so smooth and shiny that local people call it '*telsanp*' (oil snake). I remember searching for it all day long in the forest without ever finding one, only to have it slither across the road right in front of me while I walked back to camp. It shares the rich humus layer of the forest with another small reptile, the Nicobar worm lizard *Dibamus nicobaricus*. Worm lizards are a unique family of lizards that have lost their hands and legs as adaptation to a burrowing life. Though their pointed snout, scale covered eyes, and elongated body makes them look like a burrowing snake, one can still see two little flaps of skin, especially in males, where the legs used to be.

AMPHIBIAN HUNT On rainy nights, the forests reverberate with the calls of many frogs. Largest among the frogs that inhabit this island is the Shompen frog *Limnonectes shompenorum*. These frogs are named after the *Shompens*, the Indigenous people who they have shared this forest with for hundreds of years. These frogs seem to prefer the dark forest understorey and are commonly seen along perennial streams that criss-cross the forest. Unlike most frogs, they do not call often, though on occasion, one may hear a single loud '*baarrk*' coming from under an old log in a stream. It shares the forest's streams with several other frog species, including its much smaller and colourful cousin, the Nicobar cricket frog *Minervarya nicobariensis*. On forest edges and pools along the coastal littoral region lives the red-eared frog *Hylarana erythraea*. The habitat of this frog, wetlands and pools along the coastal region of Nicobar Islands, underwent massive destruction during the tsunami that hit the islands in December 2004. Particularly damaging was the subsidence of coastal land and intrusion of salt water. However, the frogs managed to survive the catastrophe and are still fairly common.

A LONG LOST SKINK The forests of Great Nicobar (and Little Nicobar) in the southern part of the Nicobar island archipelago are some of the least explored and studied in the world. Since the middle of the 19th Century, several scientific expeditions have been undertaken in this group of islands. Invariably, every single such effort has produced species new to science, though often well-known to the Indigenous people. In March 1858, the Novara expedition by the erstwhile Austrian Imperial Navy visited Great Nicobar during their expedition around the world. Among the several species they recorded was a small skink collected from near Galathea Bay, which they named *Euprepes macrotis* (now known as *Scincella macrotis*, the large-eared skink). No scientist seems to have seen another one of this species yet, a little lizard that has been lost for over 160 years.

The forests of these islands are some of the least explored and studied in the world. Every expedition has produced species new to science, though often well-known to the Indigenous people.

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So, I went looking for it. On a December evening in 2012, after a day-long search along the Galathea coast, my friend Anand James and I had climbed the ridges to the east of the Bay on our way home. On looking back, I saw the turbulent waters of the bay, being brought in by the rising tide. To our right was the beautiful forest of the Galathea Wildlife Sanctuary extending in a long curve around the bay, the dark line of the forest on the far side of the bay separated from water by a thin white line of sandy beach. Clouds were gathering, the wind had picked up, and we had to get back to camp. We had not found the lost skink, but my heart was happy, for I knew that this place was safely far away from the clasps of modern civilisation.

How wrong I was! The Galathea Bay Wildlife Sanctuary was de-notified in January 2021. The forests of Galathea Bay area, where the large-eared skink was discovered, where giant leatherback sea turtles come to nest every year, is set to be cleared, to make way for a transhipment port. If a 1.5 m.-long snake and a small lizard could both remain undiscovered in the forests of Great Nicobar, how many more such elusive species are there? We may never know, as a large chunk of the forests of Great Nicobar is soon to be cleared, and more is likely to follow. The true magnitude of this loss cannot be measured.

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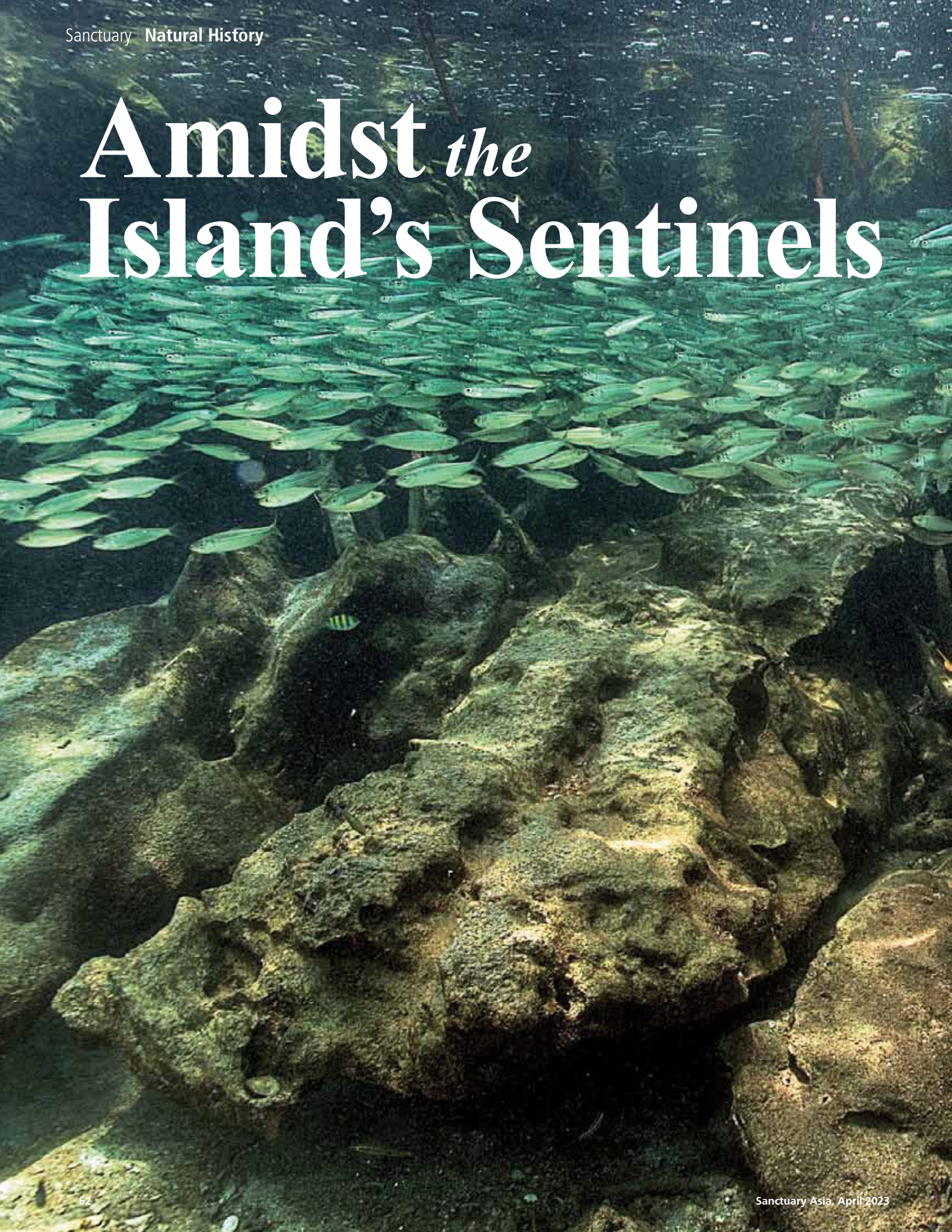
S. HARIKRISHNAN

TOP LEFT and **RIGHT** and **ABOVE** The *triangle-spotted keelback snake* Xenochrophis trianguligerus *and the fast and slender Humayun's bronzeback tree snake* Dendrelaphis humayuni *are skilled predators that feed on lizards and frogs as does the sunbeam snake* Xenopeltis unicolor *that forages in leaf-litter and humus. The latter appears to be brown until placed in bright light, when its skin reveals all the colour of the rainbow.*

My search for the large-eared skink, lost for over 160 years, did not yield any results. But my heart was happy, for I knew that this place was safely far away from the clasp of modern civilisation. How wrong I was!

Amidst *the* Island's Sentinels



With great calm and tenacity, mangroves stand guard at the transition point between land and sea, creating a rich habitat for a vast diversity of species amidst their specially adapted roots, and protect the coast from the onslaught of disrupted weather.

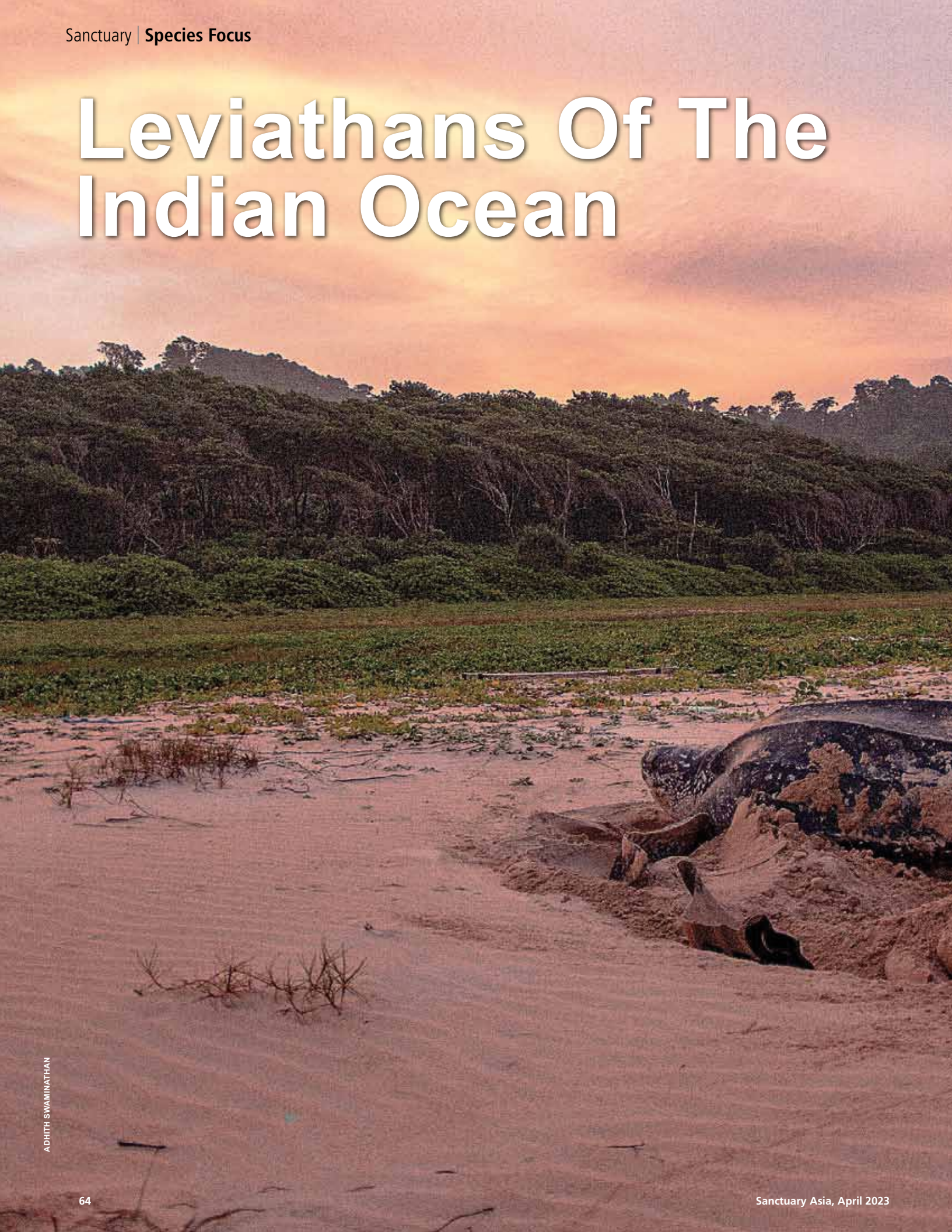
Over 80 species of mangroves, a group of trees and shrubs, grow in tropical and subtropical latitudes close to the equator. Mangrove roots are like stilts – they allow the plant to rise above the saline water, thus protecting it from the daily ingress and egress of the tides. The dense network of roots surrounded by nutrient-rich waters is an ideal nesting and breeding ground for varied aquatic species. Healthy mangroves function as a nursery for juvenile fish too.

This image was photographed on South Button Island in Richie's Archipelago in the Andaman Islands. A similar ecosystem surrounds Great Nicobar Island. Scientists observed that despite land subsidence caused by the 2004 tsunami-earthquake, some mangrove species, such as those in the Rhizophora family, could withstand the abrupt inundation of water. While mangroves around the Andamans are often located in areas with higher silt outflows, the few trees that managed to grow in the middle of South Button are surrounded by clear waters because of the island's small size, topography and predominantly coral substrate.

In murkier waters, it is difficult to visualise exactly how important these networks of submerged roots can be. But in places where the water is clear, an astonishing number of creatures – and not just fish, but also marine invertebrates – find refuge from rough seas and marine predators. Here, a mixed school of two or three different species cluster around the underwater roots of a Rhizophora tree. While there is added safety in numbers, the roots also provide small spaces and passages through which these fish can evade predation by larger fish.

PHOTOGRAPHER: Umeed Mistry
LOCATION: South Button Island, Andaman
DETAILS: Camera: Nikon D70 Lens: Nikon 14 mm. F/2.8, Aperture: F/8.0, Shutter speed: 1/80, ISO: 400, Focal length: 14 mm.
DATE AND TIME: April 20, 2008, 10:43 a.m.

Leviathans Of The Indian Ocean



ADHITH SWAMINATHAN

By Adhith Swaminathan and Kartik Shanker

Leatherbacks can be dangerous. Not in the way that elephants are, where they might charge and trample you, or bears for that matter, that might attack and maul you, or vipers or cobras, that could deliver a lethal dose of venom. No, they take up residence in your imagination and lure you to remote locations that require travel by tiny boats in choppy seas, to lands mired in malaria, and hit by the occasional tsunami. We were bitten by the 'leatherback bug' a couple of decades apart. One of us (KS) first visited Galathea in 2001 as part of his postdoctoral project on sea turtle genetics. Years later, when we started a monitoring programme at Little Andaman Island, the other (AS) joined as a research assistant and has led the monitoring work there for over a decade. After all these years, each leatherback we see is still a revelation from the sea, an archive with over 110 million years of history, a statement of survival by an ancient reptile.

The Andaman and Nicobar Islands, located southeast of mainland India in the Bay of Bengal, is home to four of the five species of sea turtles found in Indian waters.

FACING PAGE *Globally, leatherbacks are the most widely distributed of all sea turtles. Anecdotal evidence suggests that leatherbacks nested in small numbers on the mainland coast of India, with the last confirmed record of a nest from Kerala in 1956. They are sighted from time to time in the coastal waters of Tamil Nadu.*

ADHITH SWAMINATHAN

These picturesque tropical islands are the only region in India where green, hawksbill, leatherback and olive ridley turtles nest. The archipelago is a haven for sea turtle biologists to observe these animals both on land and in water.

The surrounding coral reefs and seagrass meadows are critical survival habitats for hawksbill and green turtles. Of the four species, leatherbacks have been the focus of research for the last four decades as their nesting is restricted to these Islands. Here, nesting populations have been studied through periodic surveys of remote beaches and recently, through annual monitoring programmes.

Of the 500 odd islands in the Andaman and Nicobar archipelago, leatherbacks nest in particularly high numbers on three islands: Little Andaman, Little Nicobar and Great Nicobar. In our 2016 survey of the Nicobar group, Little and Great Nicobar Islands hosted 94 per cent of all the leatherback nests recorded. However, this was not a new discovery. The late Satish Bhaskar, a pioneer of sea turtle biology and conservation in India, first visited Great Nicobar Island in 1979 and recorded large numbers of leatherback turtles nesting there. He would return in the 1980s, and in the early 1990s with Manjula Tiwari, then a rookie field biologist, to confirm that these beaches were significant for these ancient and vulnerable turtles.

Since these surveys, many research and conservation projects have been initiated across the islands. The Andaman and Nicobar Forest Department patrols all the important olive ridley nesting beaches in the North and Middle Andaman Islands, and have set up hatchery programmes that have been ongoing for decades. In 2014, a new mass nesting site was discovered in Cuthbert Bay on Middle Andaman Island, where the Department has set up a permanent monitoring camp.

ABOVE *A Forest Department hatchery in Lamia Bay of Saddle Peak National Park in North Andaman Island.*

TWO DECADES OF RESEARCH In the Nicobars, a long-term leatherback monitoring camp was set up between 2000 and 2004 in Galathea Bay on Great Nicobar Island by Harry Andrews of the Andaman Nicobar Environment Team (ANET), then a division of the Madras Crocodile Bank Trust (MCBT). During this period, over 300 individuals were marked with identification tags and around 400 nests were recorded each year on this narrow beach spanning just two kilometres.

Ambika Tripathy, a researcher with MCBT, died in the tsunami while Saw Agu's remarkable tale of survival after 10 days on a log at sea without food and water is now the stuff of legend.

However, the 2004 earthquake and tsunami severely altered coastal areas, and the nesting beaches were completely destroyed. Ambika Tripathy, a researcher with MCBT, died in the tsunami while Saw Agu's remarkable tale of survival after 10 days on a log at sea without food and water is now the stuff of legend.

Between 2004 and 2007, surveys by Andrews and Manish Chandi of ANET/MCBT suggested that the beaches in the archipelago were slowly forming again. Preliminary surveys of Little Andaman Island in 2007 also indicated that leatherback turtles had resumed nesting. We therefore initiated monitoring protocols similar to the Galathea programme in South Bay in 2008, and further expanded its scope to West Bay in 2010. Dakshin Foundation, in collaboration with the Andaman and Nicobar Forest Department, Indian Institute of Science, Bengaluru and ANET, has been monitoring these beaches for 15 years now. Between 2010 and 2014, we also tagged leatherbacks with satellite transmitters to track their migratory paths to their foraging sites. Some individuals travelled east to the coastal waters of Indonesia and western Australia, while a few travelled over 10,000 km., reaching the coasts of Madagascar and Mozambique. Some of the individuals that were tracked also remigrated and were encountered nesting on the same beach where they were originally tagged.

Nesting in the Little Andaman Island has been stable or increasing through the years. Beaches that were severely affected in the Nicobar Islands have also seen nesting numbers comparable to those recorded in the pre-tsunami era.

A POSITIVE TREND BUT...

Nesting in the Little Andaman Island has been stable or increasing in recent years and beaches that were severely affected in the Nicobar Islands have also seen nesting numbers comparable to those recorded in the pre-tsunami period. In the North East Indian Ocean region, leatherbacks also nest in small numbers on the beaches of Sri Lanka. During the COVID years when anthropogenic activity came to a standstill, leatherbacks were even reported nesting around Phuket in Thailand, a region that has had limited nesting in the last 20 years. In 2021, a leatherback tagged on Little Andaman Island was encountered nesting in Galathea, indicating that these turtles may nest on multiple beaches in the region, both within and across nesting seasons. More interestingly, an individual tagged in Galathea was found nesting 560 km. away in Simeulue Island of Aceh province of Indonesia. Further south of Aceh, they are also known to nest in the Mentawai Islands. While this population was once considered

KARTIK SHANKER AND MEERA ANNA OOMMEN

BELOW *A leatherback turtle that emerged at Galathea beach, Great Nicobar Island, during the day in February 2001.*

ADHITH SWAMINATHAN

ADHITH SWAMINATHAN

to be data deficient or declining, nesting has been relatively stable since 2004. Forty years of monitoring leatherbacks in the Andaman and Nicobar Islands has shown that these beaches host the most significant nesting population in the North East Indian Ocean.

While this is good news, and their recovery from the tsunami demonstrates their resilience to natural calamities, it is crucial to incorporate the lessons learnt from other populations across the world that have plunged as a result of egg depredation, fisheries bycatch and habitat destruction. Leatherbacks seem to return to their favourite beaches year after year even as the islands recuperated from the impacts of 2004. Any permanent alteration to these breeding sites could certainly impact their long-term survival.

Kartik Shanker is faculty at the Indian Institute of Science, Bengaluru; Founder Trustee, Dakshin Foundation; and Editor, *Current Conservation*. **Adhith Swaminathan** works with Dakshin Foundation, Bengaluru, on leatherback sea turtles in the Andaman and Nicobar Islands.

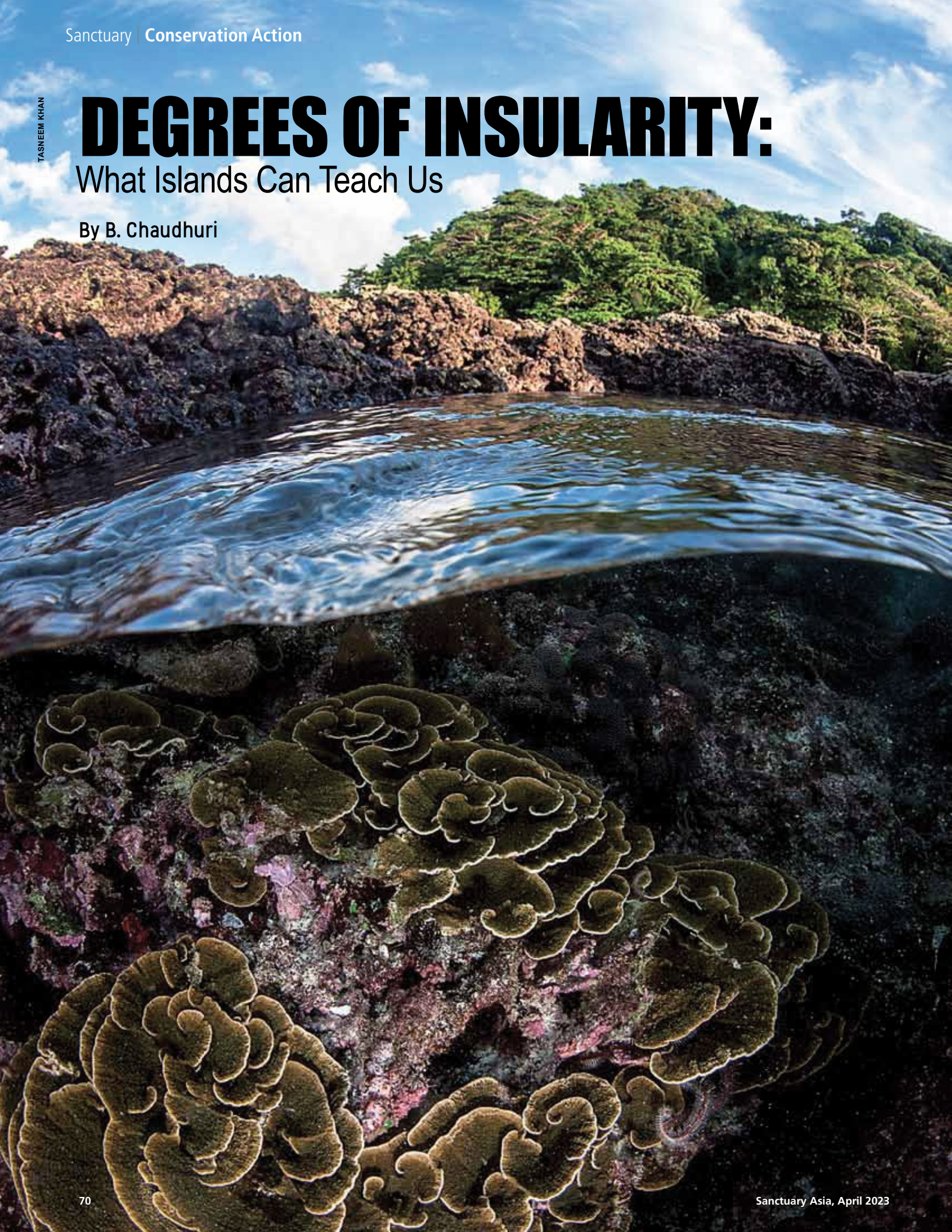
ABOVE *The Andaman and Nicobar Islands consist of two island groups, which are separated by a 150 km. wide 10-degree channel. The Andaman group comprises over 300 islands, while the Nicobar group consists of only 22 main islands.*

FACING PAGE *Although not common, leatherback turtles are sometimes found lingering on the beach even after sunrise, as the nesting process takes over three hours.*

DEGREES OF INSULARITY:

What Islands Can Teach Us

By B. Chaudhuri



TASNEEM KHAN

"…it was as if time stood still, and I was flooded with both emotion and awareness. But as I looked down at the Earth – this stunning, fragile oasis, this island that has been given to us, and that has protected all life from the harshness of space – a sadness came over me, and I was hit in the gut with an undeniable, sobering contradiction."

– Ron Garan,
NASA astronaut on seeing Earth from space, The Orbital Perspective.

The diverse ecosystems that Great Nicobar supports within a ~900 sq. km. area are not comparable to any similar mainland landmass. The diversity of such ecosystems also renders them fragile and highly vulnerable to natural and anthropogenic pressures.

Islands on Earth are often unique places, isolated from mainland continental landmasses and carved by time and the elements of nature into their distinct identities. Depending on size, maritime conditions, and biogeographical features, islands can serve as important repositories of ecological and anthropological heritage. These incredible blends of land and water are continually shaped by a complex, interlinked and dynamic interplay of geological, meteorological, and ecological processes that are influenced by a range of factors. Islands can be of different kinds, depending on geography and origin. For instance, Majuli is a riverine island that emerged from a change in the course of the Brahmaputra; Lakshadweep arose from the deposition of coral sediments and parrotfish faeces on undersea volcanic outposts; and the Andaman and Nicobar Islands (ANI) developed out of the accretion of sediments from Indo-Malayan subduction.

DIVERSITY AND VULNERABILITY The ANI constitutes an archipelago in the Bay of Bengal that supports a rich diversity of flora and fauna within a diverse range of ecosystems. Islands often present unique challenges to habitability and there are very few historical examples of human settlement of an island not coinciding with extermination of local biodiversity. However, the ANI is an example of a relatively small island archipelago where Indigenous peoples have existed for tens of millennia, without precipitating ecological catastrophes. The biogeography of these islands has been uniquely captured in the cultures of local people and shaped by their stories. One can find many examples of traditional ecological knowledge and Indigenous belief systems based around conservation in the multitude of ethnic groups that are indigenous to the archipelago. For instance, certain *Nicobarese* ethnic groups have specific forest management practices around clearing of vegetation, tied with customs that prohibit forests from being visited at specific seasons of the year, and designated zones – including entire islands – where human presence is forbidden. These customs are integrated within the rich sea of myths and folklore of the Indigenous peoples. To the mainlander's imagination, the islands might represent exotic, unknown locations for exploration but to the Indigenous peoples, each island is a microcosm of knowledge, stories, myths and cultural nuances. For a non-islander, a greater appreciation of the diversity and vulnerability of these islands can be gathered from the various accounts, memoirs and stories in the literature of people who have lived, visited, worked or been on exile on these islands.

The climatic regime on these islands is equatorial, with marginal variability in average temperatures throughout the year, a short dry season, and a long, wet season. Even though the entire archipelago lies within the tropics, each island possesses its own unique set of ecosystems, which, coupled with the Indigenous traditions, belief systems and knowledge rooted in these places, gives each one its unique identity that might not be apparent to a casual observer. During the colonial era and thereafter, there has been a gradual erasure of Indigenous socioeconomic systems rooted in land, water and forest management. Large-scale removal of natural vegetation has led to considerable heterogeneity in local temperature across the islands akin to the 'heat island' effect, apparent in metropolises in mainland India. Although the islands receive abundant rainfall during the southwest and northeast monsoons, there are reports of water stress. Local rainfall patterns have also likely been affected by deforestation over the past century. Climate change and biodiversity loss are intimately related to each other. Climate change and disruption of stable seasonal patterns and extreme weather events result in habitat and biodiversity loss and these losses exacerbate the effects of climate change. Nature-based solutions that rely on conservation of biodiversity and strengthening of ecosystems are one of the most effective methods for mitigating climate change. Healthy ecosystems and a stable climate are functions of each other, and biodiversity conservation is one of the most efficient and economically viable means of climate change mitigation.

BIODIVERSITY AND CLIMATE The stories of people who have lived or worked on these islands often reflect an understanding of how climate on these islands has been changing and how biodiversity has been on the retreat. Islands can teach us about the concept of carrying capacity, and the reciprocal relationship between biodiversity and climate. One of the most unfortunate examples that illustrates this well has been a phenomenon repeated over and over again on several tropical islands in recent human history. A large influx of settlers on islands leads to a series of cascading effects, starting off with deforestation and habitat fragmentation. This can, in remarkably short periods of time, change the entire biogeography and climate of an

FACING PAGE *The ANI archipelago is an incredible blend of land and water, continually shaped by a complex, interlinked and dynamic interplay of geological, meteorological, and ecological processes.*

GOBIND SAGAR BHARDWAJ

LEFT *The central part of the Great Nicobar Island is at a peak elevation of 914 m. and the terrain is inaccessible with dense rainforests along valleys that harbour pristine ecosystems.*

island, clearing out rainforests, leading to increased temperature and lower humidity and thereby less rainfall, which then causes the groundwater level to plummet along with the extinction of local biodiversity. A researcher who has worked in the islands (and wishes to remain anonymous) recalls that mainland settlers on ANI remember the islands to have been much wetter for nearly 10-11 months in a year, which has now drastically reduced to five to eight months, depending on where you are in the archipelago. Such a reduction in rainfall alongside rampant urbanisation has pushed Port Blair city to a predictable but previously unthinkable tipping point – a severe lack of potable water. Expectedly, several technological fixes to the water crisis are either planned or under execution but such fixes generally fail to recognise that hydrological cycles are intimately linked with other biogeochemical cycles. The fact that vegetation cover is a key determinant of climate becomes visibly important on small islands such as those of the Nicobar archipelago, where one can observe such a correlation between vegetation and microclimate firsthand. Living on an island entails a greater appreciation of the interconnectedness of natural processes and cycles and a greater understanding of how resource supply chains of the modern world operate, as well as how they fail to acknowledge the fact that there are limits to the availability and cycling rate of natural resources. Management of land and water resources becomes more important on an island due to the limited amount of land and freshwater available for use. Similarly, the management of energy and waste requires special attention on islands. The current global economic model is linear (resource extraction to waste) and works on an assumption of unlimited resource supply. Living on an island can provide a stark reality check vis-a-vis the feasibility of such a global economic model. Any model of sustainable development on islands should be able to demonstrate circularity, in order to be considered holistic.

Coastal ecosystems are ecotones between terrestrial and marine ecosystems and human activities along coastlines disrupt this continuity. Conservation of such ecotones and natural resources on islands is also extremely essential to maintain human habitability and building resilience.

The Andaman and Nicobar Islands feature two of the four biodiversity hotspots within the geographical territory of India. In contrast to the mainland, these islands have a high rate of endemism owing to their geological and ecological isolation, and owing to the fact that the region cradles both the Indo-Burma and Sundaland biogeographic zones. The islands are home to some of the most ancient Indigenous peoples of South and Southeast Asia, who have adapted to their land and the surrounding ocean over millennia. Their cultures, belief systems and traditional ecological knowledge constitute an irreplaceable heritage of humanity. From the viewpoint of biodiversity, Great Nicobar is particularly rich with a wide range of ecosystems – coral reefs and seagrass meadows, coastal wetlands and scrublands along the coastline, and a range of tropical forest types as one moves towards the interior of the island. The central part of the island is at a peak elevation of 914 m. and the terrain is inaccessible with dense rainforests along valleys that harbour pristine ecosystems. Such places are certainly important natural laboratories for life to thrive, where the forces of natural selection still operate without human interference.

CHALLENGES AND OPPORTUNITIES The diverse ecosystems that Great Nicobar supports within a ~900 sq. km. area are not comparable to any similar mainland landmass. This diversity also renders them fragile and highly vulnerable to natural and anthropogenic pressures. Factors such as disruption of stable seasonal patterns, extreme weather events, and anthropogenic effects such as land use changes, agriculture, environmental pollution and spread of diseases (e.g., avian cholera in megapodes in 1997; lumpy skin disease in cattle in 2022) and invasive species such as *Prosopis juliflora* and the giant African snail in Great Nicobar, result in loss of habitat and biodiversity.

Adequate evidence exists on how loss of biodiversity could affect agricultural productivity and ultimately, food security as well as climatic stability. Compared to technological solutions, nature-based solutions that rely on conservation and strengthening of natural systems are often sustainable and effective methods for mitigating the effects of climate change. For example, along coastlines, mangroves act as natural buffers against the effects of extreme weather events like tropical cyclones.

Coastal and island communities are particularly susceptible to the impacts of climate change such as inundation, groundwater contamination, and coastal erosion as a result of rising sea levels, aridity and intense/frequent extreme weather events. Local examples of such endangerment can be observed in the Central Nicobar islands of Chowra and Trinket, which have been casualties of groundwater contamination, rendering them uninhabitable, and Kamorta, which relies on Katchal for water supply during the dry season. Another essential island case study is Jakarta. Indonesia has recently declared that they will shift their capital from Jakarta in Sumatra to Nusantara in Borneo as a result of rapid land subsidence (26 cm. annually), a rise in the Javan sea levels, seismic risks, a clean water crisis, and several other factors. However, the seemingly environmental origin of the crisis is a culmination of century-old colonial socio-politics, which included discrimination, deprivation and the neglect of native communities. Until recently, the Jakarta government remained in absolute denial and ignored early warnings of broad scale submergence of the northern regions of Jakarta. ANI and Greater Nicobar can learn a lot from Jakarta.

Coastal ecosystems are ecotones between terrestrial and marine ecosystems, and unsustainable human activities along coastlines disrupt this continuity. Conservation of such ecotones and natural resources on islands is also extremely essential to maintain human habitability and build resilience. Strengthening climate resilience requires protection of island ecosystems and biodiversity, adoption of island-centric approaches in all aspects of life and livelihood, including but not limited to: the choice of building materials; infrastructure design; economic and societal organisation; food production, distribution and consumption; national security; governance and policy making. We need to see how our survival and sustenance on islands is intertwined with their ecological integrity – once it is threatened, we will be too. To achieve sustenance amidst the global crisis of the natural world, we need to radically reimagine 'development' by distilling it from a global capitalistic order and redefining it based on ecology, wellbeing and happiness. One hopes that a greater focus on ethics and the rights of nature emerges in the discourses around development in the near future. Our approach needs to shift from projecting conservation as a means to ensure the continuity of economic benefits arising out of nature to it being rooted in the right that natural systems should have, to exist. The people who settle in islands need to therefore, reforge their regional identities within unique insular identities in coherence with the local environment and Indigenous communities can act as models for this reforging of relationships with the natural world.

I return to reflect on the Ron Garan quote that began this piece. The analogy of Earth as an island juxtaposed on the actual experience of living on an island has brought me a sobering understanding of just how many variables need to come together to sustain life on this pale blue dot.

B. Chaudhuri has trained in neuroscience and wildlife biology research, and is experienced in undergraduate pedagogy and biodiversity conservation education.

The Ecological Splendour of Great Nicobar

With a landmass of less than a tenth of the Andaman and Nicobar Islands, Great Nicobar harbours a whopping 1,767 faunal and 811 floral species with an overall endemism of 16.96 per cent (marine biota excluded), and contributes a third of all endemic birds, and a fourth of all endemic flowering plants. High avian diversity of Great Nicobar is also a result of its location on the intersection of the Central Asian and the East Asian-Australasian bird migratory flyways, the latter being the most threatened of the eight flyways in the world. The tremendous biodiversity of the island justifies its moniker as the 'hottest hotspots of the world'. The islands are also sanctuaries for phylogenetically ancestral populations/species such as the Nicobar Megapode, the parental stock of 21 extant megapode species. Unsurprisingly, the rate of discovering novel biodiversity from Great Nicobar and this region is several fold higher than even the Western Ghats and the Northeastern Himalayas. For example, based on three expeditions between 2017 and 2019, the Central Island Agricultural Research Institute reported 39 new records of floral species from Great Nicobar.

PUBLIC DOMAIN/CHARLES J. SHARP

ABOVE *The spread of invasive species such as the giant African snail* Lissachatina fulica *in Great Nicobar, results in loss of habitat and biodiversity.*

Diving with a Master of Disguise

Scorpion fish, which belong to the Scorpaenidae family, are masters of camouflage. Spotting this marine vertebrate requires one to be a reasonably adept diver and photographer.

Also known as stone fish or rock fish, these bottom-living critters have spiny heads and some even have venomous fin spines that are capable of delivering a painful and toxic sting. They can grow up to a metre, and are generally a dull colour or a shade of red or brown. These colours allow them to blend into their habitat of rocks or corals. They are nocturnal carnivores, and they only lie in wait, ambushing the soon-to-be-morsel when it is close enough. They mainly feed on snails, fish and crustaceans. Many herbivorous prey are drawn to the algae-encrusted reefs where scorpionfish are perfectly camouflaged... a fatal mistake as the lighting-fast predator opens its jaws to create a vacuum to suck the unsuspecting prey.

I spotted this individual, when we were in the middle of a statistical survey, which meant four of us were diving next to each other in a square formation of sorts. We had to move straight, and then turn right three times to return to where we started. As this was a survey for recording different species. I wanted to get a frontal as well as a side profile. Once the bare image was taken, my colleagues wanted a closer look at this unique fish.

Content in its concealment, the fish had not moved far, until suddenly, it zoomed away from its location, perhaps realising its camouflage had failed! It all happened so fast that none of us knew where it disappeared, literally in the blink of an eye, and we couldn't find it again. Every species we sighted during that dive was exciting. After all, we were among the first few to dive in Campbell Bay.

Photographer: Digant Desai
Location: Campbell Bay, Great Nicobar
Details: Camera: Canon 7D Lens: 60 mm., Aperture: F/20, Shutter speed: 1/250, ISO: 100, **Focal length:** 60 mm.
Date and time: October 20, 2014, 12:30 p.m.

Sanctuary's

MUD ON BOOTS

Bimonthly Updates for January - February 2023

DAYS AND KNIGHTS IN RANCHI

In Koynardih, Ranchi district (Jharkhand), Project leaders Chamru Bediya and Sahebram Bediya are engaging with locals to address direct conservation challenges as well as social issues impacting biodiversity in the region. Between January and February 2023, the duo conducted eight nature walks for local children to educate them about local biodiversity, installed and monitored camera traps to document wildlife, extinguished three forest fires, and participated in two *gram sabha* meetings (in Koynardih and Hapatbeda), where ways of preventing forest fires during *mahua* flower picking season, strategies for preventing hunting during Holi celebrations, mushroom farming to enhance local livelihoods, and the importance of primary education for children were discussed with residents.

They also organised mini village film festivals for locals, screening several movies on rural, especially *adivasi* life and culture that were created by fellows of their alma mater Green Hub India. Sahebram's movie Gaj Dhoond Rahe Galiyara, which highlights the rising human-wildlife conflicts in Jharkhand amidst mining, deforestation, and urbanisation, was among the seven short movies that were screened. They have found that screening movies are a fun way of introducing new and often complex social and environmental topics among locals. It creates a friendly platform for discussing them.

Additionally, Chamru and Sahebram participated in two parent-teacher meetings where local issues such as deforestation, forest fires due to *mahua* flower picking, forest conservation, manual leaf-plate making, and local clean-up drives were discussed at length. These interactions were conducted with support from the Ekastha Foundation, a locally active NGO working to uplift marginalised communities of Jharkhand through music, education, sustainable livelihoods, and environment conservation.

Amidst these initiatives, Sahebram also travelled to Kanha (Madhya Pradesh) to attend a film festival where his movie '*Gaj Dhoond Rahe Galiyara*' was screened. Further, the duo also recorded a total of 110 birds including the Crested Serpent Eagle, Jungle Owlet, Plumbeous Water Redstart and Wire-tailed Swallow. With their hearts set on promoting human well-being through biodiversity conservation in their homeland, Chamru and Sahebram are working hard to achieve their long-term goals.

COURTSEY EKASTHA FOUNDATION

ABOVE *Chamru Bediya and Sahebram Bediya along with local children and members of Ekastha Foundation during a nature education walk.*

JHILMIL JHEEL'S BARASINGHA

Project Leader Saddam Husain Lodha is determined to protect Uttarakhand's only surviving herd of barasingha residing in the Jhilmil Jheel Conservation Reserve in his home district of Haridwar. In January 2023, Saddam identified and selected five distinct habitats (grassland, riparian, teak forest, agricultural land, and wetland) for conducting surveys in the coming months. Following this, he approached the district Forest Department, seeking permission to start monitoring barasingha and bird populations in the Jhilmil Jheel Conservation Reserve and its surrounding areas.

In February, Saddam devoted time to the Great Backyard Bird Count 2023 by preparing five checklists of birds sighted in 17 hotspots around Gujjar *basti* and Gaindikhata. During the four-day annual survey he, along with other members of Maee, documented a whopping 123 species of birds including the Ruddy Shelduck, Orange-headed Thrush, and Eurasian Hoopoe. Saddam used this event to arrange two birdwatching sessions for 23 odd local *Van Gujjar* children and shared information about bird identification marks, nests, and nesting sites. He plans to continue such walks in the coming months as outdoor activities offer fun ways of encouraging curiosity and appreciation for nature among children.

While still awaiting a work permit, Saddam conducted three pilot surveys within the Jhilmil Jheel Conservation Reserve to gain a preliminary understanding of the important parameters that need to be considered for this upcoming monitoring

COURTESY ARUN SAINI

ABOVE *The Jhilmil Jheel Conservation Reserve in Haridwar district is home to Uttarakhand's only surviving herd of barasingha or swamp deer.*

work. Meanwhile, his idea about forming a *nukkad natak* (street theatre) troupe to perform plays as a form of nature education and outreach in Gaindikhata was received with enthusiasm by members of Maee and friends, who have ensured their support for this interesting project.

WETLAND WARRIORS OF GONDIA

In Maharastra's Gondia district, Project Leaders Kanhaiyalal Udapure and Shashank Ladekar are protecting wetlands that are home to the region's aquatic flora and diverse avifauna including the Sarus Crane (an IUCN-designated vulnerable indicator species). Drawing on their collective past experiences of working for wetland conservation and interactions with wetland experts, researchers, and members of local communities, Kanhaiyalal and Shashank have identified 10 wetlands for their project.

In the upcoming months, Kanhaiyalal and Shashank will work with their mentor Shivona Bhojwani to strategise management techniques in the wetlands so as to support wildlife and provide livelihoods to local communities. The wetlands were selected based on 11 parameters, including being Sarus Crane habitats, having the potential to host migratory birds, being appropriate sites for aquatic plants and vegetation, and facing threats such as habitat degradation, etc.

In preparation for this work, the duo received training on collecting and storing seeds for piloting a 'seed bank' from Dr. Susan Galatowitsch, a wetland ecologist and researcher from the University of Minnesota (USA).

Kanhaiyalal and Shashank also organised and led the Asian Waterbird Census in Gondia with support from 48 local participants to celebrate World Wetlands Day (February 2, 2023) and recorded 2,000 birds belonging to 55 species from four wetlands that are active homes of Sarus Cranes. Additionally, the team conducted a birding session for 120 children in Seoni village, which is an active roosting and foraging site for Sarus Cranes. During an interactive awareness session with local children about the region's biodiversity, the duo shared a slideshow on the environment and resident birds.

TIGER OF THE CAUVERY

A gifted fisherman with immense knowledge of fish, fish behaviour, and traditional fishing technique, Project Leader Jesu Das is now mentoring fishermen from local communities to use the cast netting technique in the study and monitoring of fish species.

In January 2023, he safely captured 18 wild mahseer by cast netting to monitor and study them. This study is a preliminary step towards his goal of maintaining a healthy stock of the critically endangered humpback mahseer at the Humpback Mahseer Repository (Bheemeshwari). After determining water cycling protocols and feeding cycles with the help of his colleagues at the Wildlife Association of South India (WASI), he assisted scientists from the National Bureau for Fish Genetic Resources (NBFGR) to tag 14 of these mahseer for identification and genetic analysis.

Das received training on the use of standard water quality testing kits and ensured the health of mahseer by routinely monitoring the repository for 11 water quality parameters. He also provided orientation on the importance of the repository project and its functions to 59 visitors including the DC (Chamarajanagar district), several high-ranking officers of the Karnataka Forest Department, and scientists from NBFGR. Das assisted WASI's team in conducting a study aimed at understanding the ecological requirements of the mahseer in the Cauvery Wildlife Sanctuary through radio telemetry. Before this, he completed training on the use of specific equipment and tracking and collected GPS locations and several environmental data crucial to the study.

An expert in his craft, Jesu Das is acquiring new skill sets and blending them with his traditional knowledge of fish and fishing. In doing so, Das is slowly curating new purpose for his traditional skills and leading the way for other fisherfolk in the region.

COURTESY WASI

ABOVE *Jesu Das handling a 3.8 kg. adult bluefin mahseer as part of the mahseer radiotelemetry study conducted by WASI.*

PROJECT UPDATES

A Sanctuary Report – January to March 2023

Notes, anecdotes and reports from Sanctuary Nature Foundation's projects across the country.

SANCTUARY PHOTOLIBRARY

ABOVE *Fancy dress participants at the Kids for Tigers' Festival in Maharashtra Nature Park, Mumbai on February 17, 2023. The programme's theme for 2022-23 'Only One Earth' was highlighted through a series of events, including a wildlife-themed fancy dress competition.*

SANCTUARY PHOTOLIBRARY

ABOVE *Children from Kids for Tigers' Kolkata schools during the 'Art for the Wild' Exhibition at the Gold Gallery.*

BAJAJ ELECTRICAL'S SUPPORT FOR THE ANANT BAJAJ PARYAVARAN MITRA KIDS FOR TIGERS PROGRAMME

IN MUMBAI, MAHARASHTRA

Nature Trail: February 17, 2023

As many as 250 kids, teachers, and parents started out on a 'Save the Tiger' Nature Trail, to appreciate the biodiversity of the remarkable Maharashtra Nature Park in the middle of the city that was once Mumbai's largest waste dump! Located next to Dharavi, this natural wonderland has turned into a virtual nature education hub for lakhs of children, particularly those from less privileged backgrounds. On the trail, conducted by expert naturalists, the children heard and saw Coppersmith Barbets, Common Tailorbirds, Common Mynas, House Sparrows, Black Kites, White-throated Kingfishers, parakeets and, of course, the ever-present crows. Additionally, they observed arthropods including ants, butterflies, and spiders. Curious and wide-eyed, the young naturalists were captivated. Nature Trails are a way for people young and old to access natural areas without damaging delicate ecosystems. By staying on designated trails and practicing the principle of 'leave no trace', visitors can help protect the environment and ensure that these urban habitats remain intact for future generations to enjoy.

Tiger Fest: February 17, 2023

The much-awaited annual inter-school Kids for Tigers Festival was held at the Maharashtra Nature Park, with 650 students from 17 schools in attendance! The programme's theme for 2022-23, Only One Earth, was highlighted through a series of events ranging from art installations, a wildlife-themed fancy dress competition, music from waste, natural rangoli, and face painting!

HT PAREKH FOUNDATION SUPPORT FOR KIDS FOR TIGERS

IN KOLKATA, WEST BENGAL

Art for the Wild: February 21-23, 2023

To strengthen the relationship between people and nature 'Art for the Wild', an exhibition of children's paintings and sketches, was held at Gallery Gold in South Kolkata. The objective of the three-day exhibition was to stimulate creativity and spread awareness on the need for wildlife and nature conservation. The exhibition was organised by Sanctuary Nature Foundation's Kids for Tigers and its Kolkata partners, SHER, an NGO run by the husband-and-wife team of Suchandra and Joydip Kundu. Thanks to the CSR support of H T Parekh Foundation, we were able to hire a popular art gallery where 255 artworks, drawn by Kids for Tigers' '*vanar sena*' adolescents (shortlisted from over 1,000 artworks created by children ranging from eight to 16 years) were exhibited.

IN THE SUNDARBAN BIOSPHERE RESERVE, WEST BENGAL

Community Events

In association with Kids for Tigers, SHER continued wildlife-related film screenings and Audio-Visual shows in one of India's most remote wildlife areas, the Sundarban Tiger Reserve and Biosphere. The purpose was to connect and educate local communities with their wild surrounds, to enable them to know more about the connection between biodiversity conservation and its positive impact on the climate crisis that threatens the world's largest mangrove ecosystem!

Skill-Share Workshop in Mumbai: March 1- 4, 2023

A vital workshop was organised in Mumbai for four carefully chosen, professional nature guides from the Sundarban Tiger Reserve, in association with the Wildlife Protection Society of India (WPSI) with help from the Sanjay Gandhi National Park and the support of H T Parekh Foundation. The purpose was to upskill nature guides and expose them to some of India's finest naturalists and ornithologists. This is vital to their careers and future livelihoods as ambassadors for the Sundarban Tiger Reserve, so they can better understand and communicate with visitors. The participants arrived in Mumbai on March 1, 2023 and were taken to the Sanjay Gandhi National Park, where the programme was conducted. A wealth of knowledge was imparted to the guides in a short span of time by incredibly knowledgeable and experienced resource persons. Talks were held on a wide range of wildlife and natural history topics, beginning with a session on mammals by Saurabh Sawant, a professional naturalist, conservationist, and wildlife photographer. Saurabh also demonstrated how nature guides can help visitors get better images by themselves understanding light and shutter speeds, in conjunction with animal behaviour. Adesh Shivkar, who has vast experience with wildlife tourism and is the founder of the Mumbai Bird Watchers Club, spoke of how visitors could be mesmerised by birdwatching. Dr. Amol Patwardhan, an entomologist and Assistant Professor in Zoology at the K. J. Somaiya College in Mumbai, shared his knowledge and fascination for butterflies and other 'lesser' life forms. Dr. Parvish Pandya, Sanctuary's Consultant Director for Science and Conservation, focused on the wildlife and ecology of mangrove habitats. Amar Deshpande, Senior Manager of Wetland Management and Sustainability at Godrej India, highlighted the ecosystem services provided by mangroves, and Vivek Kulkarni, Senior Environmental Professional, spoke on the vulnerability of islands to climatic changes. It was a powerful and diverse faculty that included the likes of Dr. Suchandra Dutta, Associate Professor and Head of Department, Botany at Rishi Dayaram and Seth Hassaram National College (RD and SH National College), Mumbai, who elaborately spoke about the world of plants.

INDUSIND BANK SUPPORT FOR KIDS FOR TIGERS

At six locations across India: the National Capital Region of Delhi, Bengaluru in Karnataka, Nagpur in Maharashtra, Coimbatore in Tamil Nadu, Hyderabad in Andhra Pradesh and the surrounds of the Panna Tiger Reserve in Madhya Pradesh.

In the last few action-packed months, the Kids for Tigers programme in all six locations above were undertaken. The Tiger Fests were designed to enable kids to give expression to their determination to work to understand and protect natural India. The fests were all large-scale celebrations of biodiversity that brought students and teachers together from different schools to participate in events ranging from art installations from recycled material, wildlife-themed fancy dress parades, eco-friendly rangoli creations, non-toxic face painting, skits and performances, and more!

Kids for Tigers camps were successfully organised for selected Sanctuary's Tiger Ambassadors and teachers from select Kids for Tigers schools. All the camps were held in wildernesses of nearby Protected Areas, where students were introduced to the magic of nature and to the difficult task that forest staff had in protecting this natural heritage. Tiger Ambassadors from Nagpur were taken on a thrilling tour to the Tadoba-Andhari Tiger Reserve. Bengaluru Tiger Ambassadors visited Kabini in the Nagarahole National Park. Delhi Tiger Ambassadors spent time in the Ranthambhore National Park, and those from Panna visited the Panna Tiger Reserve! Coimbatore students were treated to visits to Top Slip in the Anamalai Biosphere Reserve, and those from Hyderabad visited the Eturnagaram Wildlife Sanctuary. All our Tiger Ambassadors met and interacted with naturalists, wildlife biologists, and Forest Department staff, and went on guided safaris and birding treks on foot in the company of adult supervisors, forest officials and naturalists. From the responses received, students, teachers and Sanctuary's Kids for Tigers' Coordinators all came away with fresh perspectives and renewed purpose!

The Coimbatore students were treated to exciting nature trails to Kovai Kutralam and their experiences were shared with the citizens of Tamil Nadu through the national newspaper, *The Hindu*! Similar trails were conducted at the Asola Bhatti Wildlife Sanctuary for Delhi students, and in Panna for students from Panna schools.

SANCTUARY PHOTOLIBRARY

ABOVE *Tiger Ambassadors from Hyderabad participated in a Regional Camp in the Eturnagaram Wildlife Sanctuary.*

MORNINGSTAR-INDIA SUPPORT FOR KIDS FOR TIGERS

RANTHAMBHORE VILLAGE CONTACT PROGRAMME

In and around 45 villages on the periphery of the Ranthambhore Tiger Reserve, Rajasthan, a year long programme unfolded with Govardhan Meena, who was himself a Kids for Tigers alumnus at the age of 13 years! Now in his mid-30s, he is Sanctuary's experienced and charismatic Sawai Madhopur Kids for Tigers Coordinator. Working closely with the Sanctuary staff, he holds film screenings, drawing competitions, wildlife poster exhibitions, Audio-Visual shows, and more. The entire Sanctuary team works as one unit to strengthen the Ranthambhore programme, since this was the birthplace of *Sanctuary* magazine, where the late Fateh Singh Rathore, who virtually mothered the Ranthambhore Tiger Reserve, was honoured by our children. Some of the youth of Ranthambhore have been a part of Sanctuary's mission for over two decades and to help them with their career development, Morningstar donated computers for us to start Sanctuary Computer Labs, that resulted in as many as 28 youth clearing the much-respected RS-CIT exam in February 2023. This sets them up for employment, even as they are poised to take up leadership positions in their respective villages.

WILDLIFE CRIME AND PUNISHMENT:
EQUIPPING THE ENFORCERS AND INTERPRETERS OF LAW

By Purva Variyar

ABOVE *Forest officers of the Madhya Pradesh Forest Department engage in a mock crime scene to practice investigation skills during a special Forensics Training programme organised by WCT at the National Forensic Science University, Gandhinagar, in October 2021.*

The journey of a wildlife crime, from its undertaking to its adjudication in the court of law, is a complex affair fraught with umpteen challenges for law enforcement agencies in their struggle to prove the crime in a courtroom and receive just conviction. This journey is riddled with systemic gaps that run deep. Crimes against wildlife are rampant and thriving in India. Hunting protected species for subsistence, traditional medicine, religious practices, and wildlife trafficking; illegal entry into Protected Areas and their destruction and more pose serious threats to India's wildlife populations and habitats, which are already being dealt severe blows by various other anthropogenic pressures. And sadly, the conviction rate of wildlife crime cases in India is less than five per cent.

Fortunately, legislation in India provides an extensive framework to protect wildlife and its habitat, and the environment. But laws robust only in theory are toothless.

"The provisions of the *Wild Life (Protection) Act,* 1972, (here on referred to as the Act), are protectionist in approach and prescribe a variety of prohibitions that can be interpreted widely. The Act is among the strongest legal frameworks for protecting wildlife in the world. While enforcement finds invoking the right sections and producing immaculate paperwork tricky, creatively applying the law to the facts of a case can strengthen cases and improve conviction rates. It is up to prosecutors and lawyers to assist forest officers to ensure that this happens," says Mridula Vijairaghavan, Environmental Lawyer with the Wildlife Conservation Trust (WCT).

Mridula, along with members of WCT's Combatting Wildlife Crime (CWC) Programme team, is bridging the gap when it comes to knowledge and capacity of the forest staff as well as prosecutors and judges with respect to wildlife protection laws in India. WCT's CWC Programme, supported by DSP Investment Managers, works with varied stakeholders including state forest departments, judiciary and public prosecutors to improve detection, prosecution and conviction of wildlife crimes.

Justice can only be achieved when all the cogs of the wildlife law and enforcement wheel are in sync. A very important cog is the judiciary, alongside law enforcement officers and policymakers.

Through its CWC Programme, WCT is not only training and building capacity of various state forest departments in wildlife law enforcement and crime scene investigation, but is also working to systematically sensitise and create increased awareness through specialised workshops for various levels of the judiciary.

SENSITISING THE JUDICIARY

It is make or break in a courtroom. So much rests on the presiding judge's sound judgement, knowledge, fairness, and powers of interpretation of both, the provisions of the law as well as evidence. It falls upon the prosecutors to articulate evidence and testimony, and build watertight cases that can withstand scrutiny in the court of law. It is critically important then, that lawyers and presiding judges have an optimal grasp of the complex issues regarding wildlife.

"Cases of wildlife crime are tried before magistrates who adjudicate a range of cases from murder and rape to narcotics and negligence. They deal with a massive number of legislations on a daily basis, making it hard to pay particular attention to a special Act like the *Wild Life (Protection) Act,* 1972. Judges may not be immediately familiar with it, or the context in which it operates. Therefore, sensitising the judiciary about the nuances and intricacies of the Act, and, more importantly, to the plight of wildlife and the heavy costs of wildlife trade can go a long way in having a more aware judge presiding over the case. Several trial court judgments now take a compassionate view towards wildlife and emphatically state this in their judgments, indicating that sensitisation programmes for the judiciary play a significant role in the fight against wildlife crime," explains Mridula.

MPSJA

ABOVE *WCT's Forensics expert, C. Samyukta (front row, fourth from left), with the participating senior judiciary members and lawyers at the symposium held by WCT at the Madhya Pradesh State Judicial Academy, Jabalpur, in 2022.*

The training programmes for judges and prosecutors are intensive and are conducted by WCT's team of law and forensics experts in collaboration with the forest department and institutions such as the Madhya Pradesh State Judicial Academy. WCT is also using such workshops as opportunities to bring two important stakeholders involved in the prosecution of wildlife crime together in the same room – forest officers and prosecutors.

In February 2023, in collaboration with the Madhya Pradesh Forest Department, WCT hosted a two-day workshop for 20 Additional District Prosecution Officers (ADPOs) from 18 districts of Madhya Pradesh at the Van Vihar National Park, Bhopal. The workshop focused on challenges in the implementation of the Act and the procedural hindrances faced by forest staff while prosecuting wildlife crimes. Various senior officers from the Madhya Pradesh Forest Department interacted with the attending prosecutors.

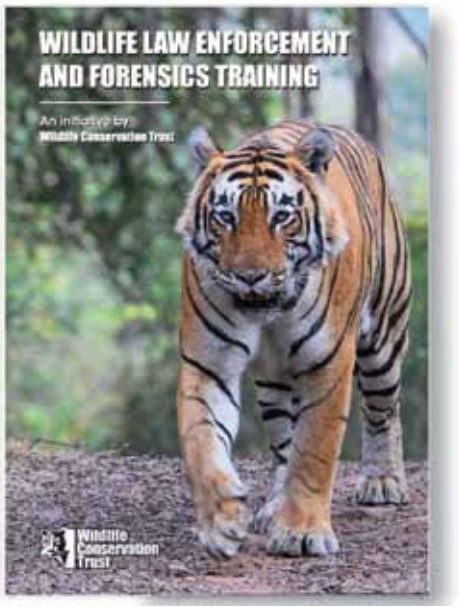
"Where their [forest officers'] investigation ends, our work begins. Wildlife crimes are on the rise, and such workshops by WCT are helping prosecutors like me to better understand the challenges and shortcomings of the forest staff, provisions of the Act, and the multi-faceted nature of wildlife crime. Poor interpretation of sections of the Act, shoddy handling and processing of evidence as well as weak crime scene investigation skills often result in poorly drafted Preliminary Offence Reports (POR) and weak case papers. Ultimately, such wildlife crime cases do not stand a chance at obtaining rightful convictions, thereby

PURVA VARIYAR/WCT

WCT is training and building capacity of various state forest departments in wildlife law enforcement and crime scene investigation and working to systematically sensitise and create awareness through workshops for the judiciary.

WCT

WCT



TOP *WCT's law and forensics experts (top left) train a batch of frontline forest staff. Wildlife Law Enforcement and Forensics Training Manual (above) produced by WCT.*

LEFT *Hon'ble Justice Kamal Khata, Bombay High Court (middle), presiding over the final round of the 4th Wildlife Protection Government Law College National Moot Court Competition, held on January 22, 2023, at the Government Law College auditorium.*

letting offenders go scot-free," says Neeraj Pandey, ADPO, Rewa, Madhya Pradesh, who participated in the Bhopal workshop.

EQUIPPING THE FOREST STAFF Do you see much of a difference between the terms 'wild animal' and 'wild life'? Or 'animal' and 'captive animal'? Or 'meat', 'trophy' and 'animal article'? On legal paperwork being presented to the court as evidence by a forest officer, the difference is stark and even a single out-of-place term could potentially weaken a case. In the court of law, a case hinges on the accuracy of terminology and interpretation of provisions of the Act.

"Intention is the backbone of any crime, including crimes against wildlife. Proving the intention behind offence/s committed, suspected or otherwise, beyond reasonable doubt in the court of law is the be-all and end-all of prosecution," says Mridula. Hence, it is important for forest officers to ensure that the offender is charged under the correct sections of the Act.

"Sometimes, based on available evidence and circumstances, say in a case involving hunting, it is easier to prove an accompanying offence, such as illegal possession or illegal entry into a sanctuary with weapons instead of hunting itself, and invoking allied sections of the Act is a smarter way of making the charges stick. This requires in-depth understanding of the Act and the nature of wildlife crimes, and this is what we are trying to inculcate within the forest staff, lawyers and senior members of the judiciary," explains C. Samyukta, Forensics Expert, WCT.

The aim is to strengthen enforcement capacity in forest departments to detect, investigate and build strong cases against wildlife offenders. Over 15,500 forest guards have benefitted from WCT's law enforcement training and forensics workshops.

WCT is equipping the forest staff with knowledge of the Act, and improved understanding of the powers vested in them under the Act. The aim is to strengthen the enforcement capacity within the state forest departments. More than 15,500 forest guards across 40 Protected Areas in India have benefitted from WCT's law enforcement training and forensics workshops so far. Regular Wildlife Law Enforcement and Forensics training programmes for the frontline forest staff, senior forest officers, division-level forest officers and also trainees at the Forest Training Institutes in Maharashtra and Madhya Pradesh are conducted by WCT in collaboration with state forest departments.

But, apart from training the forest staff, WCT is now on a mission to build a solid network of lawyers across India who

WCT

ABOVE *The 2020 batch of trainees at the Forest Training Institute, Jalna, with WCT's Law Enforcement experts during a three-day workshop.*

are motivated to volunteer their time to assist forest staff by providing legal advice and inputs on paperwork. This will help to build stronger cases and augment the efforts of forest staff and contribute to the fight against wildlife crime.

"As lawyers may not be immediately familiar with the nitty-gritties of the *Wild Life (Protection) Act,* 1972 and allied laws, WCT is working towards conducting workshops for practicing lawyers who are interested in volunteering their time with the forest staff and prosecutors on wildlife crime cases," says Mridula.

In February 2023, in collaboration with the School of Law, Christ University, Bengaluru, WCT organised an intensive workshop, which was attended by 17 practicing lawyers from across India who were shortlisted from among many applications, and 29 law students from Christ University. This initiative has received rave responses from the legal community, with many of them willing to lend their expertise for the good of wildlife.

CATCHING THEM YOUNG

India desperately needs an army of dedicated and trained environmental lawyers who are well-versed with the plethora of environment, climate and conservation-related issues that plague our country.

"Courtrooms across India are overburdened with cases of crime against humans. As a result, cases filed against hunters, polluters, illegal wildlife traders, and animal cruelty incidents are lost in the clutter. A sharp legal mind is needed to bring judges' attention and justice to these environmental, wildlife, and animal rights 'underdogs'. When combined with a judiciary that has been sensitised and trained in wildlife law, such legal acumen will ensure that strong sentencing of wildlife criminals becomes the norm rather than the exception," says Samyukta.

While working with established law professionals is necessary, it is equally important to catch them young. Building interest around environmental education and wildlife conservation among young law students will prove fruitful in the long run. And to this end, WCT's unique wildlife protection-themed National Moot Court Competition in collaboration with Mumbai's Government Law College is a promising endeavour. Already four editions old, this DSP Investment Managers-funded competition sees law students from around 16 prestigious law colleges across India participating annually.

This event is helping participating law students get a serious understanding of the challenges of wildlife conservation and environment. The reading and preparations they have to undertake to deliberate on the carefully curated moot problems that are built around real, pressing and current wildlife issues makes them more conversant with these otherwise neglected matters. The format of the competition pits them against each other in legal arenas that are presided over by some of the most accomplished judges from the Bombay High Court.

"In the long-term, the event hopes to build a pool of bright legal minds for combatting wildlife and forest crime issues," Samyukta adds.

Purva Variyar is a Conservation and Science Writer with the Wildlife Conservation Trust. She has previously worked with *Sanctuary Asia* magazine and with the Gerry Martin Project.

While working with established law professionals is necessary, it is equally important to catch them young. India needs dedicated and trained environmental lawyers well-versed with environment, climate and conservation-related issues.

PUBLIC DOMAIN/YERCAUD ELANGO

The Imperiled Nicobar Palm

By Soham Kacker

Picture an island. What do you see? Chances are you imagined a warm climate, palm trees and pristine beaches. Palms, or members of the botanical family *Arecaceae*, have become representative of island ecosystems, and the Andaman and Nicobar Islands are no exception. The island group, formed around the same time as the Indonesian archipelago and by the same tectonic event that created the Himalaya, plays host to 33 species of palms, with 18 of them being endemic to the islands. One of these in particular, *Bentinckia nicobarica* or the Nicobar palm, is restricted to the Nicobar Islands and listed as Endangered by the IUCN Red List of species. Now, with the islands facing the pressures of climate change and increasing urban and infrastructural development, the Nicobar palm and other endemic species are at real threat of extinction. However, the case of the Nicobar palm is of special concern, since island extinctions are particularly harmful. First, we have to ask what makes island biodiversity so interesting?

The two forefathers of evolution – Charles Darwin and Alfred Russel Wallace – both struck upon their theories of evolution by natural selection while exploring archipelagos. Darwin famously noticed how finches in the Galapagos islands seemed to diversify into different forms on different islands, and Wallace noticed similar patterns with birds and butterflies in the Malay islands. Islands form a natural laboratory for evolution, because they are geographically isolated. This causes the preservation of small genetic variations in any species which makes it to the island, since they cannot breed with a mainland population. This process of genetic isolation and amplification accelerates speciation. This natural pattern is, in principle, why islands show such high rates of endemism – and the same goes for plants.

Palms, in particular, are quick to colonise islands. Several palms have edible or buoyant fruits and seeds, allowing them to disperse to islands more effectively. Their tough leaves and slender, flexible stems make them ideal to withstand harsh and exposed island conditions, and their ability to reproduce asexually (many palms form clonal clusters, or colonies) ensures they can establish a large population quickly. These traits have facilitated the speciation of palms into over 2,600 species, and have kept them a part of tropical ecosystems for 80 million years. Unfortunately, this high rate of endemism among this taxon means that many palms have a very limited geographical range, and face immediate threats of extinction.

Palms are vital to humans. They form one of the oldest crops, with records of date-palm cultivation in Egypt existing from almost 5,000 years ago. After grasses and beans, palms form the third most agriculturally important plant family in the world. In India, the coconut palm alone annually contributes 3.8 billion USD to the country's economy. Aside from human uses, palms form vital habitat for animal biodiversity; help in stabilising soil and mitigating the effects of natural disasters; and serve as a model system to study biogeographic evolution. In the case of the Nicobar palm, it exists in increasingly smaller habitat fragments, and is critically under-studied in terms of its interactions with other plants and animals. Previously assessed by the IUCN 25 years ago, its current status of preservation is mostly unknown. On Mauritius, the endemic Mauritian bottle palm *Hyophorbe amaricaulis* is reduced to a single remaining specimen, the last representative of a population gradually whittled down by habitat loss. If immediate conservation action is not taken, the Nicobar palm and other unique species stand to face a similar unsettling fate. Such species serve as urgent reminders of the need to pay special conservation attention to islands, and recognise – in policy and in public dialogue – the unique evolutionary history and biodiversity they represent.

Further reading:

Eiserhardt, Wolf L., et al. 'Geographical Ecology of the Palms (Arecaceae): Determinants of Diversity and Distributions across Spatial Scales.' Annals of Botany, *Vol. 108, No. 8, 2011, pp. 1391–1416., https://doi.org/10.1093/aob/mcr146.*

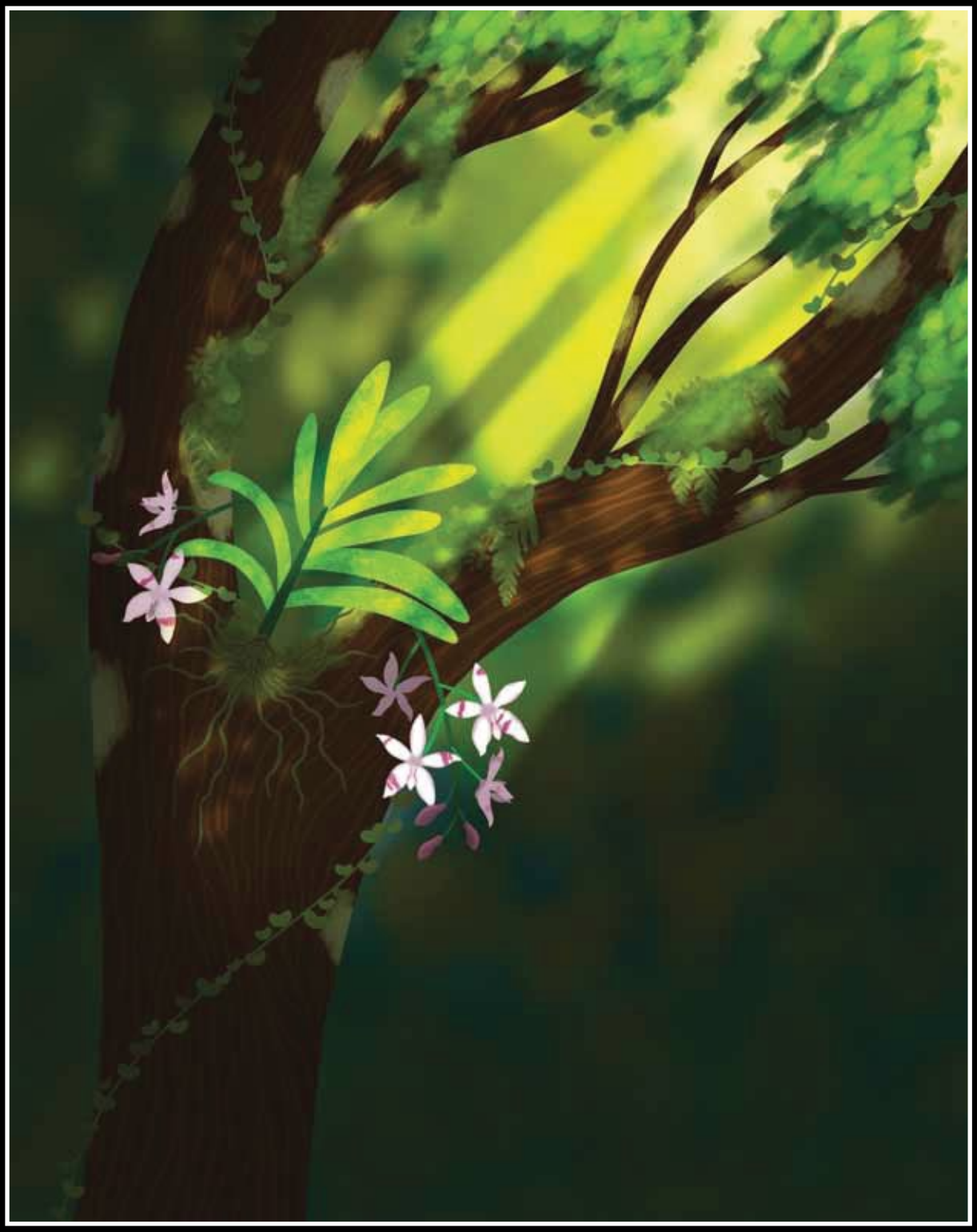
Manohara, T. N., et al. 'Diversity and Conservation of Palms in Andaman & Nicobar Archipelago.' Biodiversity and Conservation, *Vol. 19, No. 13, 2010, pp. 3655–3666., https://doi.org/10.1007/s10531-010-9918-6.*

FACING PAGE *The Nicobar palm* Bentinckia nicobarica *is an elegant palm tree with arching leaves and a greyish white trunk. It is restricted to the Nicobar Islands and listed as Endangered by the IUCN Red List of species.*

BELOW *This specimen of Mauritian bottle palm* Hyophorbe amaricaulis *from Curepipe Botanic Gardens in Mauritius is an "endling", last known individual of its species.*

PUBLIC DOMAIN/COOLTH/WIKIPEDIA

Soham Kacker is passionate about plants and has apprenticed at the Auroville Botanical Gardens and the Aravalli Biodiversity Park. Based in New Delhi, he is currently a research student at Ashoka University, focusing on plant ecology and conservation.



The flowers of the endemic orchid *Phalaenopsis speciosa* are like the outcome of a child's gleeful artwork – haphazardly painted blotches, streaks and patches of rosy-purple on fleshy white petals, which means that no two plants have the same flowers. Apart from its five identically shaped petals, the fragrant flower has a sixth oblong petal called the 'labellum', protruding like an extra finger from its centre. The orchid blooms between late spring and early winter, and grows in clusters on an almost 0.3 m.-long inflorescence. Like other epiphytic orchids, this herbaceous (non-woody) plant hangs off trunks, with four to five fleshy leaves growing to a dark green hue, reminiscent of humid rainforests. *P. speciosa*, considered to be synonymous with *Phalaenopsis tetraspis*, is endemic to Great Nicobar Island, and was first described far back in 1881.

The Sanctuary Papers

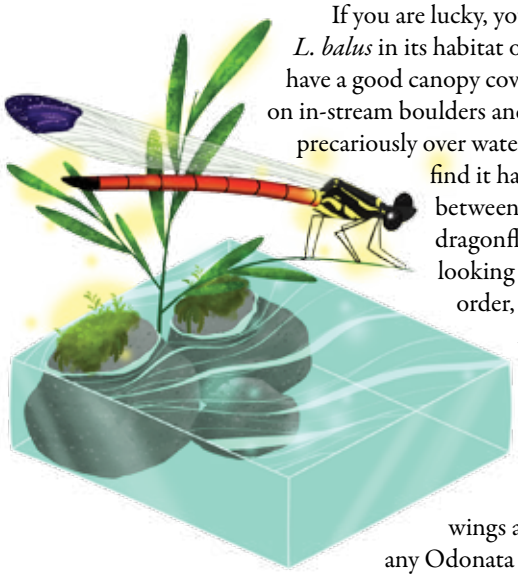
Swadha Pardesi is a freelance digital illustrator in wildlife and nature conservation. She likes to use her skills of journalistic inquiry, understanding of ecology, visual art and imagination to express wordy concepts via aesthetic science communication illustrations. She is subtly political in her work, which is deeply inspired by volunteering at Let India Breathe, a collective of climate change campaigners and communicators.

When she was 19 years old, she stayed at ARRS Agumbe, Karnataka, for a month as a volunteer. It was her first time being in such a wilderness and one of the most immersive experiences of her life. To this day, she draws inspiration from her time there and pours it into her illustrations. Animals and habitats, one cannot exist without the other. Thus, she wanted to share glimpses into the biodiversity hosted by Great Nicobar Island in her creations for Sanctuary Papers.

Text By Shatakshi Gawade & Illustrations by Swadha Pardesi

Finding a Damsel(fly) with Prehistoric Roots

The *Libellago balus*, a damselfy endemic to Great Nicobar Island (GNI), was rediscovered on the island after being known only from museum specimens. The species was reported in a paper released as recently as 2023, adding to the understanding that the southernmost tip of India still has much unknown and undescribed biodiversity. This damselfly has ethereal, translucent wings tipped with a glorious purple patch, and a segmented, slender fiery red abdomen. Very little is known about this insect of the order Odonata, and its limited numbers has earned it a place as an endangered species in the IUCN Red List. There are at least 24 species of odonata fauna on GNI, of which three are endemic.



If you are lucky, you might see the *L. balus* in its habitat of forested streams that have a good canopy cover, or sitting delicately on in-stream boulders and twigs hanging precariously over waterbodies. In case you find it hard to differentiate between damselflies and dragonflies, the other similar-looking insect of the Odonata order, remember that the latter have stockier bodies than the former. Dragonfly wings remain outstretched at rest whereas damselfly wings are kept closed. Seeing any Odonata fauna is like looking into prehistoric times – fossils of this ancient order of insects have been found to date back to the Permian era from 250 million years ago!

Would the Nicobar Flying Fox Like its Name?

Would the Nicobar flying fox *Pteropus faunulus* be disappointed that it has been named after a terrestrial mammal instead of a name it can call its own? So what if it has an uncanny resemblance to a fox? One might think that its endemic, endangered status would earn it a lovely, exotic name, more suited to the Great Nicobar Island, where it lives. The Nicobar flying fox was first described in 1902 by G.S. Miller, and rediscovered after over a century in the Nicobar Islands by Dr. Bandana Aul Arora and her team during a survey to record bat species and their habitats. The Nicobar flying fox is a fruit bat – it feeds on fruit and nectar, and is nocturnal. The *Pteropus faunulus* is also one of only two known solitary roosting bats of the Pteropus genus – the other is restricted to the American Samoan Islands – and the only *Pteropus* species in India. It has been hunted by Indigenous tribes as well as settlers on Great Nicobar. Unlike its generic name, this fact is not so surprising, considering the *Wild Life (Protection) Act* (1972) categorises *all* fruit bats as vermin, and has placed them in Schedule V. Despite being endangered, the Act excludes it from legal protection. The primary causes for reducing numbers of this species are hunting by local communities and loss of habitat on account of clearing of its forests for coconut plantations and settlements.

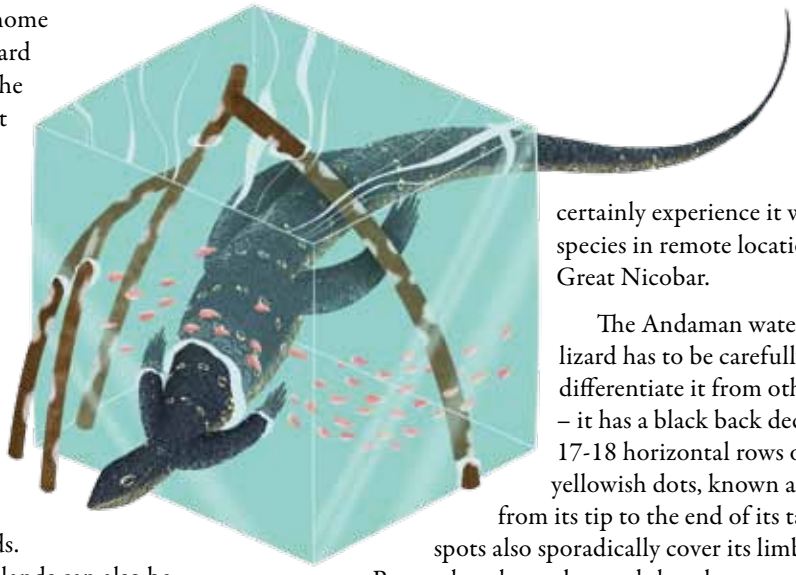
Did You Know?

. *The* Nicobarese*, the Indigenous people of the Nicobar Islands, believe that there are two kinds of bats – big and small. While local dialects vary from island to island, big bats are called* mok-ne-aka law *(big fruit bat) and medium and small fruit bats are called* mok-ne-aka peh *in Central and Southern Nicobar Group Islands.* Hinglenea *is the name for the insect eating microbats.*

A CASE OF MIXED IDENTITIES

For the longest time, the Great Nicobar Serpent Eagle *Spilornis klossi* was considered a subspecies of the Crested Serpent Eagle *Spilornis cheela*, but is now identified as a separate species altogether. It is the smallest known serpent eagle – it can be distinguished by its size, pale brown plumage, unmarked cinnamon-buff breast and a short black crest tipped with rufous, and a black crown, which looks a lot like a wig! Between its sharp beak and killer eyes is a sunny yellow patch, which matches the colour of its legs. It is also known as the South Nicobar Serpent Eagle, and is endemic to forests of Great Nicobar and Pujo Kunji, Little Nicobar and Menchal. It is found in primary forest, often in the canopy up to 600 m. above sea level, and also in regenerating habitats and grasslands. It most likely feeds on reptiles, rodents, and birds. Like many endemic species on Great Nicobar, the Great Nicobar Serpent Eagle is threatened by habitat loss. The settlements on the Nicobar Islands are already a threat to this small bird of prey, and planned development projects could damage its habitat further. The decreasing numbers have put it in the near threatened category in the IUCN Red List.

A DARWINIAN DÉJÀ VU



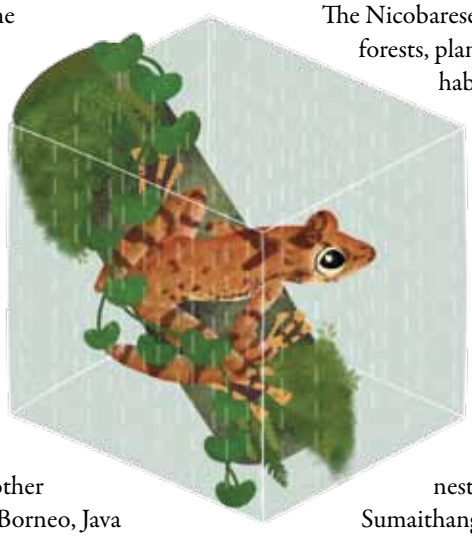
The Andaman and Nicobar Islands are home to the endemic Andaman water monitor lizard *Varanus salvator andamanensis*. Curiously, the central and northern Nicobar Islands do not host this giant lizard, but are home only to the Southeast Asian water monitor *V. s. macromaculatus*. Researcher Indraneil Das suggested in 1999 that reptiles such as the Andaman water monitor, the skink *Lipinia macrotympanum* and others could have reached the Andaman Islands when they were connected with Arakan Yomas (the Rakhine Mountains of Myanmar) when global sea levels were much lower than they are now, about 2.58 to 0.011 million years ago, and populations could have also spread to the Nicobar Islands. The dispersal of these reptiles on different islands can also be attributed to ocean currents. The presence of two closely related species is a classic example of allopatric speciation – species separated by geographic barriers – that prompted Darwin to formulate his theory of evolution by natural selection. If intergenerational déjà vu were a thing, researchers today would certainly experience it while studying species in remote locations such as Great Nicobar.

The Andaman water monitor lizard has to be carefully observed to differentiate it from other monitors – it has a black back decorated by 17-18 horizontal rows of light yellowish dots, known as ocelli, right from its tip to the end of its tail. These spots also sporadically cover its limbs and tail. Researchers have observed that these spots fade with age. *V. s. macromaculatus* meanwhile has a greyish or brown body with a higher average scale count. Scientists are still wondering about the similarity of these water monitor species, and if they could even be the same species. This would require in-depth studies of older museum specimens as well as DNA analysis.

Did You Know?

The Nicobar long-tailed macaque has cheek pouches like all other macaques, baboons and guenons – the other members of its subfamily Cercopithecine. These pouches extend down the side of its neck and allow it to collect and temporarily store food such as nuts, seeds and fruit. The pouch has enzymes, which break down the food and begin digestion. Insects however, are gulped down in a blink!

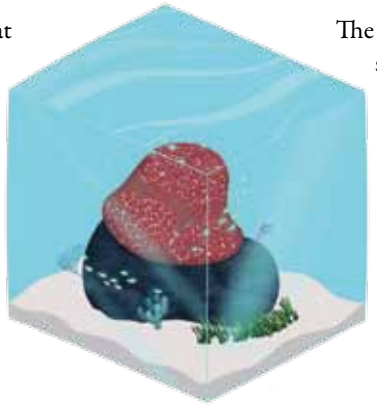
A FROG THAT CHUCKLES



Like many species on Great Nicobar, the Nicobarese tree frog *Polypedates insularis* is endemic, endangered and poorly known. In 2018, 23 years after it was first described by Indraneil Das in 1995, scientists made a detailed description of its morphology, breeding and distribution. This long gap between the two instances goes to show how remote these islands are for continuous research, and how much more biodiversity wealth is yet to be discovered. Though it is the only representative of its family Rhacophoridae on these islands, this amphibian family is highly species rich in other islands of Southeast Asia such as Sumatra, Borneo, Java and Philippines.

The Nicobarese tree frog is commonly found in evergreen forests, plantations and among vegetation near human habitation. Its colour varies from pale to dark brownish, and males are smaller than females. Some individuals of this species have a distinct hourglass shape etched onto their backs. Rain seems to be an aphrodisiac for these amphibians – they breed and court each other during the monsoon as well as during (late May to September) as well as sporadic, aseasonal rainfall between the months of January and March, and they have been observed to mate near still freshwater. The result of these amorous interactions is a foamy, hemispherical nest that yields light brown tadpoles. The researcher Sumaithangi R. Chandramouli describes their low pitch calls as *trk... trk... trk...* sounds, followed by a series of chuckles!

A STOIC, RESILIENT REEF-BUILDER



Coral reefs are so rich in species diversity that they are known as the 'rainforests' of the ocean. They directly and indirectly sustain over five crore people, and protect the coast from natural disasters. The reefs in the Andaman and Nicobar Islands are biologically more diverse than other Indian reefs due to their geographic proximity and connectivity to the Indo-Pacific coral triangle (a marine region comprising the Philippines, Malaysia, Indonesia, Timor-Leste, Papua New Guinea and the Solomon Islands). There are at least 273 species of scleractinian corals in the Great Nicobar Island, which is around 47 per cent of Indian scleractinian species. They are known as stony corals as they build themselves a hard skeleton of calcium carbonate. An individual is known as a polyp, and it lives either solitarily or in colonies. The polyp lives only in the topmost part of the mature exoskeleton, while the rest of the coral is non-living. This reef-building characteristic makes them extremely important for the underwater ecosystem. They have been dominant reef-building organisms for the past 240 million years. Scleractinian corals have a skeleton with radial structures called septa, which are arranged in multiples of six.

The two inflection points in the life of the scleractinian corals of the Andaman and Nicobar Islands are the 2004 earthquake-cum-tsunami, which devastated reef habitats, and the 2010 mass bleaching event, which damaged the health of scleractinian corals. However, the corals were resilient – despite considerable damage in both these events, they continued growing in favourable circumstances.

Recent discoveries in Great Nicobar Island

Insects: The moths *Garudinia shompen* (2022), *Trilocha nicobar* (2021) and *Cyana conclusa* (2020); scarab beetle *Clyster galateansis* (2020); the longhorn beetle *Sarmydus nicobarensis* (2019); whitefly *Asialeyrodes nicobarica* (2019); mayfly *Choroterpes nicobarensis* (2017); and damselfly *Nosoticta nicobarica* (2017).
Reptiles: The geckos *Gekko stoliczkai* (2021) and *Cnemaspis nicobaricus* (2020), and the skink *Eutropis dattaroyi* (2020).
Aquatic: The spangled flatworm *Acanthozoon fuscobulbosum* (2018), and the flatworm *Pseudoceros galatheensis* (2017).
And more...: The frog *Microhyla nakkavaram* (2022), flowering plant *Septemeranthus nicobaricus* (2021), and lichen *Leiorreuma nicobarense* (2017).

Did You Know?

The dugong Dugong dugon *is the state animal of Andaman and Nicobar Islands, and is found mostly in the waters around Great Nicobar Island, in north Andaman and Ritchie's Archipelago here. This large, nomadic marine mammal is also known as a sea cow or locally as* pani suwar *(sea pig). Despite having a wide range in Indo-Pacific tropical waters, it is vulnerable to extinction on account of hunting, pollution and habitat loss.*

SOHAM DIXIT

GREAT NICOBAR NEEDS US NOW

By Ishika Ramakrishna

Two months after four species of sea turtles shuffle onto the stretches of Great Nicobar Island's (GNI) beaches to lay their eggs in carefully thermoregulated, sandy nests, palm-sized hatchlings emerge. These young ones must then brave the sea's crashing tides and several natural predators such as the White-bellied Sea Eagle, the Great Nicobar Serpent Eagle, domestic dogs and large fish to make it to the open ocean. Those that survive their first journey into the sea, still vulnerable, will battle several natural and human-made obstacles to make it to adulthood.

Sea turtles, including the critically endangered leatherback turtle, often return to the same regions where they were born to lay their eggs. As they foray into the marine world as hatchlings, they form long-lasting memories of their place of birth, and navigate back to these sands to propagate future generations of these rare species. The coastal stretches along Great Nicobar Island have been historically ideal for sea turtle nesting – clean, undisturbed beaches sheltered by mangroves and lagoons, with minimal interference from people.

Twenty years from today, when these hatchlings – who overcame every ecological hurdle to reach maturity – are ready to begin this cycle of reproduction again, what will Great Nicobar have in store for them?

For the last two years, wheels have been turning towards a major Rs. 72,000 crore project on Great Nicobar Island, spearheaded by NITI Aayog and the Andaman and Nicobar Islands Integrated Development Corporation (ANIIDCO). This includes the construction of an international transhipment port, a power plant and associated township area that could be a Special Economic Zone, and an

GOBIND SAGAR BHARDWAJ

FACING PAGE AND RIGHT *The Great Nicobar Project, which is to be implemented over the next 30 years, will lead to the inevitable destruction of 244 sq. km. of old growth rainforests and coastal forests, and the loss of 10 lakh trees. We stand to endanger and lose endemic species like the Nicobar treeshrew, Nicobar Megapode, and much more.*

international airport. All these interlinked projects, to be implemented over the next 30 years, together will lead to the inevitable destruction of 244 sq. km. of old growth rainforests and coastal forests, and the loss of 10 lakh trees. Construction of this scale will also place unrealistic demands on the island's natural resources, requiring an estimated 86,600 kilolitres of water per day, for which surface reservoirs will need to be built. Despite several objections from concerned researchers, conservationists and citizens thus far, including responses to the inadequate Environmental Impact Assessment of 2021, the proposed developmental plans are progressing at a rapid rate.

The Andaman and Nicobar Forest Department, National Board for Wildlife and the Tribal Welfare Department in the islands allegedly have coordinated their efforts to fast-track these plans. This has involved denotifying expanses of the UNESCO Biosphere Reserve and Galathea National Park to facilitate the looming constructions. If left unchecked, we stand to endanger and lose indigenous tribal communities, several rare and endemic species, neighbouring marine life, vast littoral stretches, sea turtle and megapode nesting habitats and prehistoric rainforests.

Apart from the assured loss of biodiversity and the social implications of an infrastructure project of this magnitude, GNI faces potential hazards from developing a township on seismically volatile land of over 149 sq. km. Sudden alterations to the environment will have catastrophic consequences to the entire island, a phenomenon observed following the devastating tsunami of 2004. Two decades after this calamity, GNI – its people, ecosystems and biodiversity – is still in recovery. We can only imagine what consistent habitat alterations and large-scale disturbances could mean for this indispensable island.

The turtles, megapodes, macaques and people of Great Nicobar need immediate support and long-term conservation. It is time for each one of us to do our part by lending our voices to their plight in a joint effort to prove that it isn't too late already.

What you can do

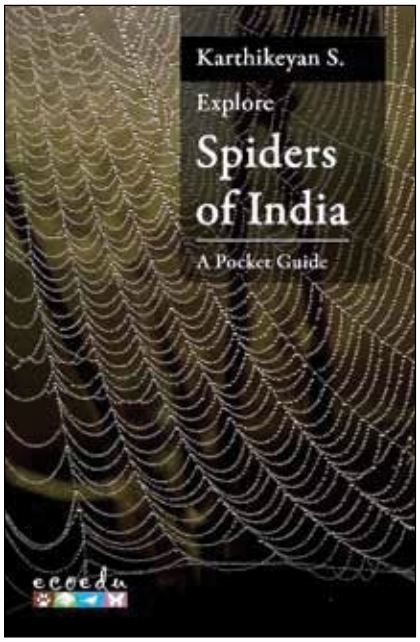
1. Write letters/emails to the MoEFCC, PCCF-ANI, NITI Aayog, EAC, Ministry of Tribal Affairs and the NGT, voicing your concern and disapproval. Urge them to re-notify the crucial tracts of land that have already been denotified.
2. Read widely and circulate any letters of opposition that have been sent out by citizen activists and scientists. Some of these can be accessed here: rb.gy/kqexre
3. Support ongoing campaigns to scrap clearances and current unrealistic development plans in Great Nicobar Island by (a) writing to the companies involved in the process to highlight how disastrous this can be: https://infra.economictimes.indiatimes.com/news/ports-shipping/adani-ports-concor-jsw-infra-among-ten-entities-file-eoi-for-container-transhipment-hub-in-great-nicobar-island/98493152h and (b) signing petitions and adding your voice to letters being sent daily to concerned authorities: https://www.letindiabreathe.org/v2/SaveGNI

Great Nicobar Island is an ecological marvel with teeming biodiversity packed into a tiny space of just 910 sq. km. This floating, tropical oasis in the Andaman Sea carries crucial and unique habitats and micro-environments – from mangrove forests and coral reefs, to dense rainforests and agrarian landscapes. Indigenous *Shompen* and *Nicobarese* communities have long occupied the island, and share space with settler communities from mainland India who migrated here in the 1960s. The island's equatorial positioning, climate and biogeography have resulted in a unique assemblage of flora and fauna. Great Nicobar houses the Nicobar long-tailed macaques, Nicobar Megapode, Nicobar treeshrew, Nicobar tree fern, Nicobar Serpent Eagle, Nicobar Sparrowhawk and many more. From their names alone, it is clear that these species are dependent exclusively on Great Nicobar, have evolved over time to inhabit these environments alone, and are found nowhere else in the world.

Ishika Ramakrishna is a Doctoral Fellow at the Centre for Wildlife Studies. She first began her work on human-nonhuman primate relationships in Great Nicobar Island during her time at the National Centre for Biological Sciences, and now works in Assam. She is also a podcaster and science communicator with a love for nature education.

BOOK REVIEWS

With improved technology and a much greater appetite among the young for books to remind them of the wonderful biosphere in which they live, it is heartening to see how many new, high-quality publications are emerging from within India. Here are three books that *Sanctuary* believes should be in every public library and in the homes of all those whose hearts beat to nature's drum.



EXPLORE SPIDERS OF INDIA: A POCKET GUIDE

By Karthikeyan S.
Published by EcoEdu Consultants Pvt. Ltd.
Paperback, 200 pages, Rs. 450/-

"If you want to live and thrive let the spider run alive" – a Spanish proverb.

First, a disclosure: I have been fascinated by spiders, those fascinating eight-legged hunters, since I was a child. I would spend countless moments watching them spin webs, hunt and otherwise go about their busy lives, at home, in city gardens, even in school classrooms, and offices! And of course, also in deep forests, during birdwatching trips, walking trails, waiting in hides, and on treks in the Western Ghats and the Himalaya.

This tiny pocket book is a fantastic edition on the natural history of India. The author is an accomplished naturalist, photographer who currently heads Karnataka's famous tourism venture, Jungle Lodges.

Anyone interested in identifying spiders or wanting to know a touch more about the natural history of these arachnids absolutely must keep a copy handy. I found the tiny book easy to read, easy to understand and useful when it came to exploring the behavioural characteristics, identities and strategies of spiders. I also enjoyed reading about how they differed from their relatives... scorpions, harvestmen, ticks, mites and more!

Written in a chatty style, the author touches on arachnophobia (the fear of spiders). "Spiders are venomous but often the venom is potent only to their natural prey. So far, no Indian spider species has been found to be venomous to humans. If you happen to handle a particularly hairy spider, however, it might give you a bit of a nip if it feels threatened," he writes.

Well written and edited, this fascinating book is usefully dotted with colour images. The guide covers 20 spider families and more than 100 genera. I would recommend acquiring a copy, even to keep as a quick reference at home!

Reviewed by Bittu Sahgal

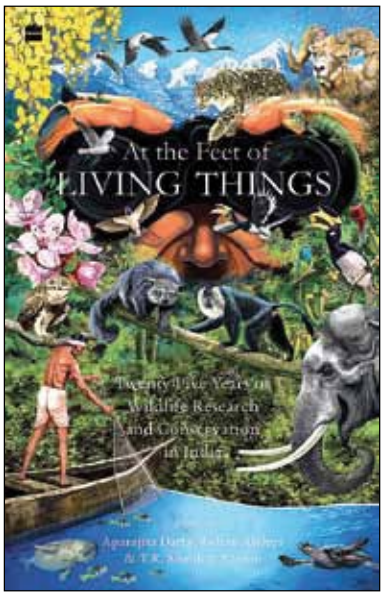
AT THE FEET OF LIVING THINGS: TWENTY-FIVE YEARS OF WILDLIFE RESEARCH AND CONSERVATION IN INDIA

Edited by Aparajita Datta, Rohan Arthur and T.R. Shankar Raman
Published by HarperCollins
Paperback, 400 pages, Rs. 389/-

"There are two ways to be a student of nature," begins *At the Feet of Living Things*. "You can collect, preserve, dissect and describe it, accurate in every sinew and cell. Or you can breathe along with it, engage with its messiness and feel what it feels to be a thing in the world." This second kind of student recognises that to be human is not to be separate from nature, but to be an intrinsic part of it. This is a core philosophy woven through the book chronicling the research done by the Nature Conservation Foundation (NCF) over two and a half decades, '*At the Feet of Living Things: Twenty-Five Years of Wildlife Research and Conservation in India*'.

When one thinks of wildlife research, one pictures a khaki-and-camouflage clad person – usually a man – trekking, alone, through a dense forest, pausing at regular intervals to take notes, lay plots, or observe the mysteries of nature, either through a magnifying lens or binoculars.

The essays in this book blow this stereotype to smithereens, with descriptions of women and men working with their teams of people, often struggling to connect with local communities, in villages and towns and cities across the country. A clear focus of this book is on the relationship between people and nature, mirroring the research done by NCF over the years.



COURTESY HARPERCOLLINS INDIA.

What stands out is how these essays are not success stories glorifying a conservation rockstar, but rather personal portraits by these researchers, of the people they have worked with and the species they have studied, the challenges, failures and successes they have faced along the way. Aparajita Datta writes about hornbill conservation in the Northeast, and working with the local communities there. Rucha Karkarey and Mayuresh Gangal write about their

efforts to preserve the squaretail grouper in the Lakshadweep archipelago, working with local fisherfolk to establish a community reserve – and its unintended consequences. Charudutt Mishra writes about snow leopard conservation, and Elrika D'Souza about dugongs. Ananda Kumar, Ganesh Raghunathan, Vinod Krishnan and Sreedhar Vijaykrishnan write about their efforts to mitigate human-elephant conflict in Tamil Nadu and Karnataka, a chapter that was in turn heart-breaking and heart-warming. Shankar Raman and Divya Mudappa recount the restoration of Valparai over two decades, an inspiring story also told in the beautiful documentary, 'A Dream of Trees'. Suhel Quader's essay on birding for citizen science made me want to pick up my binoculars and run out the door to make a checklist for eBird! Each essay was a delight to read, well written and edited, giving one an idea of how wildlife research takes place, but without getting overly technical.

The book has beautifully detailed illustrations courtesy NCF researcher Sartaj Ghuman, which bring the writing to life – a personal favourite being the two donkeys peering out of the page and into your soul, concern for the author when he falls ill evident in their expressions!

When it comes to conservation, there is no silver bullet, and the varied approaches adopted by the NCF team through trial and error, over years, shows how important it is to tailor solutions to the specifications of an area. Reading *At the Feet of Living Things* gives a clear, unromanticised picture of the wildlife research conducted by NCF over the last twenty-five years. It inspires you to find ways to contribute to nature conservation yourself, even in as simple a way as opening up SeasonWatch or eBird, and noting the wildlife in your backyard.

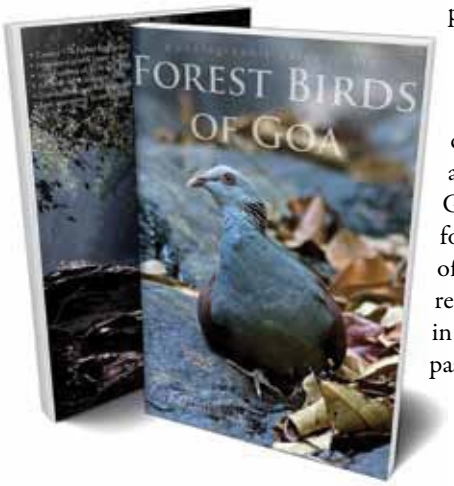
Reviewed by Bhavya Iyer

A PHOTOGRAPHIC GUIDE TO THE FOREST BIRDS OF GOA

By Prasanna Parab, Co-authors Paresh Porob and Omkar Dharwadkar
Published by PP Publishing
Paperback, 152 pages, Rs. 875/-

For everyone with their nose pointed up in the air or squished down by a pair of binoculars, this photographic guide is a vibrant and information-packed addition to your Goa backpack.

The campaign to protect Goa's Mollem forest from infrastructural linear projects is still fresh in our minds, and so are the disastrous and distressing fires that ravaged the state in March 2023. The book comes at an opportune moment, giving concerned citizens a solid document on which pleas for protection can be based, and also opens up a treasure trove for the enchanted.



Before diving into bird descriptions, the book spends a thoughtful moment on Goa's forests. The first page on forest types of Goa is evidence of the deep, first-hand research that was undertaken in creating this book over the past 13 odd years, after it was conceptualised in 2009. I would urge at least a cursory glance at all the ecosystems mentioned here, such as the Myristica swamps, so that the next time you are out scouring the terrain for birds, you can also appreciate the surroundings.


PRASANNA PARAB

By beginning with forest types and then also including the association between each bird and different plants, the authors bring in an ecosystem view for birding. This book is certainly not only about spotting a bird and adding it to a birding list, but identifying the ecosystem it needs. Birds thus become a symbolic species for the much larger goal of conservation through this book. But if such intense science does not float your boat, you can happily jump to the pages dedicated to the centrepiece of the book – 114 forest birds.

These pages are divided into two chunks – non-passerine and passerine birds. Each page has a uniform format that includes the bird's most used name, scientific name, other common names, its local name, IUCN Red List status, *Wildlife (Protection) Act* schedule, field characters, habitat and behaviour, and its status in Goa. An original image of each bird shines on the thick, glossy paper, photographed either by the authors or contributors. It is wonderful that the local names are written in the Devanagari script. The morphological description also includes information about whether the sexes are the same or not. The distribution map is valuable too – in case you spot a bird in a completely unexpected area, you could start assessing why it was there in the first place: is the species seeking new habitats? Why? Is the population increasing? And so on.

Delightfully, each page has a description of the bird's song or call. For instance, 'a soft "*chiee*" ending with a rapid trill' of the Ultramarine Flycatcher, or the 'loud echoing barks "*gaark*"' of the Great Hornbill. Just imagining what the bird may sound like gives the 2D book a life-like character.

After the pages dedicated to the forest birds, the book has a list of endemic species, followed by a much-needed bibliography. The book draws to a close with a list of local and scientific names of the plants mentioned throughout the bird description pages. A key list, also at the end, has a helpful collection of forest birding trails.

Most firsts in life are memorable, and so is my first bird book – Sálim Ali's *The Book of Indian Birds*. This guide on the forest birds of Goa cannot be used to identify birds, as that tome can be. One will need to find a way to first identify a bird in the field, and then look it up in this guide, to add to their understanding about the species. This book is certainly a valuable resource for the birds of Goa.

And finally, a gorgeous quote by Robert Lynd on the back cover closes out and sets the tone for this book – "In order to see birds, it is necessary to become a part of the silence".

Reviewed by Shatakshi Gawade

NETWORKING

Join *Sanctuary's* online network

The Sanctuary Nature Foundation's print, on-ground and online network has grown to over a million caring individuals in India and across the globe. We would be delighted if you were to invite your family and friends to join this purposeful group to celebrate and protect our planet and its utterly miraculous biosphere.

@sanctuaryasiapage
@sanctuaryasiagroup

@SanctuaryAsia
@SanctuaryAsia

In Conversation with Bittu Sahgal: Nurturer of Environmental Hope in @rgsustain

carapiranha Truth be told, he's both the original and the goat. Yes, I watched the entire thing.

iamanilghelani Superb chat. Great idea, Bittu Sir how you took the initiative to recognise people who are not famous and shine the spotlight on them. Get well-known people to give the award, but let guys with mud on their boots receive the awards.

shahidbamne Bittu sir is always an inspiration!

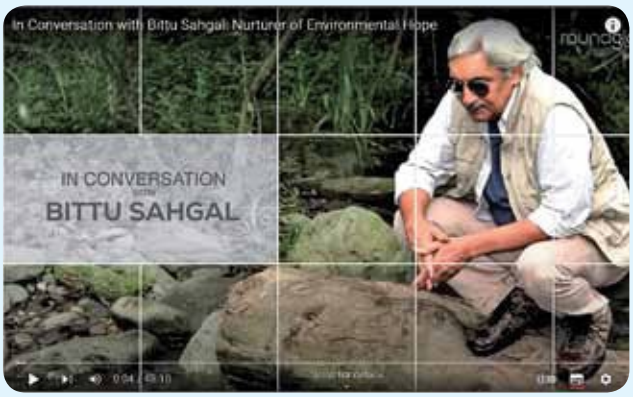
mouli_films This is fascinating! Would absolutely love to see more origin stories!

anuranjan.roy Bittu sir is always inspirational! Sanctuary has always been fabulous from the beginning.

rounakpatra6691 Every word is a gem!

Sharan Venkatesh Just finished watching this on YouTube. What a lively conversation talking about so much of his experiences and learnings.

sarumahdi The original, goat! My forever boss, best friend who between rocks his little hoodie so well. Thanks @MeghaMoorthy and @RGSustain1 for doing this in the funnest way. Kudos. This interview is informative, reflective, heartwarming, true and adorable. @BittuSahgal Gen Z icon?



On Kids for Tigers Fest Nagpur

prachigalange Brilliant! Love the energy the kids bring to the Tiger Fest!

On Know Our Project Leaders

treetalkwithmallikaravikumar So lovely to hear about their effort. And wonderful that you are shining the spotlight on such lesser-known efforts.

On the February Cover

@nehaa_sinha Is this the best cover I have ever seen? Yes, I am totally biased about birds, but I think so!

@Jagadhish_raghuraman What a shot! Kudos to his patience and hard work.

On the photo essay The Elephant in the Room

@gdsingleton The elephant family on the bridge! How horrifying that trains aren't required to lower their speeds, or wait for them to cross! So many preventable deaths!

@indresh.sachdeva Humans have sadly always abused animals and kept them in captivity for their greed, self-interests, entertainment and to get rich – whether domesticated or wild.


KRISHNAKUMAR MECHOOR

Dhiraj Mirajkar Bet that majestic creature is being made to beg for two-legged animals. Needs to be confiscated and sent to an elephant rescue place.

@amitkackrot It's horrible. Only if we could save them. Otherwise we will only have Lord Ganesha's statue left as a symbol of the elephant.

On Ramki Sreenivasan's Tribute

@vibe_of_the_forest Legends never die. Their legacy lives forever! What a man. The first award I got was from him.

@shirish219 Salute for his contribution to nature protection for us and our children.

READERS' FORUM

Collage art featuring images from @sanctuaryasia

Sanctuary has been a part of my household for as long as I can remember. Nature is one of the passions we share in our family and as a kid, I would often flip through the latest editions, admiring the beautiful compositions. Now, even though we do not get the magazine as often as before, I still find myself getting back to the cabinet that holds the editions we have to flip through and read (enjoying them even more now).

The images in this collage are from a particular edition that fell victim to the years and as a wildlife/nature enthusiast, I knew I couldn't let the magazine just be lost completely. The whole process of creating the collage really took me back to when I first came across *Sanctuary*, when I barely knew how to read and I realise now that I get back to it, more than ever.

I salvaged quite a few pictures from this edition and look forward to using them all to create a series of collages mixed with my own art style.

Yajnaseni, Jamshedpur, Jharkhand

On Phytofocus

Superb. I love cauliflorous and ramiflorous trees... some interesting ones in Arunachal forests.

Aparajita Datta, Bengaluru

Nice essay on these bizzare (not so bizzare?) plants.

Chintan Sheth

SOHAM KACKER

IN OUR NEXT ISSUE...

Of Lesser-known Stripes Among Tangled Roots

The country's second scientific estimation of the fishing cat, a globally threatened wetland species, has revealed that it continues to thrive in the Sundarban, the world's largest mangrove heritage site. The Sundarban, along with the greater Ganges Brahmaputra basin, has always provided a stable habitat for the species throughout geological history. **Justin Jones**, Deputy Field Director, Sundarban Tiger Reserve, and fishing cat expert, **Tiasa Adhya**, elucidate the importance of the current study and its relevance to global conservation efforts.

PARTHA DEY

DARSHAN KHATAU

On Rajaji: Elephant and Leopard in Tigerland

Being such an important elephant corridor, Rajaji has been neglected for too long on account of the lack of attention and hype it receives as compared to other Protected Areas. It is time to shift back focus on the Shivaliks, which hold incredible biodiversity. Meanwhile, leopards are also equally important to maintain the food chain and balance in those areas. More work like this will invoke interest among wildlife enthusiasts. The avian fauna of the region also needs attention. Great work by the entire team.

Ratul Ghosh, birdwatcher and wildlife photographer, New Delhi

The Kalesar National Park and Wildlife Sanctuary, which is connected to the adjacent Rajaji Tiger Reserve, has the same fauna and flora but sadly, despite being the biggest Protected Area of Haryana, nothing is being done to protect this forest. The four to five resident elephants have been killed, trees are illegally cut and animals poached. In the national park, even chital, sambar and barking deer are now rare to spot because poaching is rampant. The area once even had lions and tigers, the latter occasionally now sighted in Simbalbada, Himachal Pradesh. Human disturbance and lack of prey base in Kalesar keeps wild cats away. The birdlife is still rich and diverse but habitat degradation continues apace including permitting private vehicles inside a Protected Area.

wildlifeofharyana

ROUNAK PATRA

Dolphins of Malabar Hill

Once ubiquitous along the coasts of India, Indian Ocean humpback dolphins are now found in scattered pockets – one of which is the bay off Raj Bhavan, Mumbai. **Darshan Khatau** observes these intelligent delphinids, watching them socialise and forage in their pods, and writes of the challenges facing this vulnerable marine species.

Author's Speak

Article: The Eight Passage Deities Of Kutchh

It's always a warm feeling to share the joys of nature with like-minded persons, and none more so than *Sanctuary* readers. That joy and warmth is also tempered by the responsibility to provide a scientifically accurate article to a discerning readership, written by someone with no formal training in the area!

Dr. Ram Gopalakrishnan, Senior Consultant, Infectious Disease, Apollo Hospitals, Chennai

SAURABH SAWANT

Article: A Misplaced Safari

It is important for us to stand up for our forests. It is also important for us to stand up for our immediate environment. But what happens if concepts of 'wild' and 'city' collide? The Aravallis are endangered by their proximity to cities like Delhi and Gurugram – and this is why ill-thought plans come up, which look to monetise the wild by changing its basic nature. The Aravallis should be restored as a wildlife corridor, and its intrinsic value should be recognised. Making the world's largest safari in the Aravallis makes sense to me only if the natural area is restored and loved as it is, not as a series of enclosures.

Neha Sinha, Delhi

Article: Rajaji: Elephant and Leopard in Tigerland

A lot of our time was spent in the core area of western Rajaji. At the beginning of our fieldwork in 2020, the park had only two safari vehicles. Our sole aim in writing this piece goes back to an idle day in the field. While having lunch and looking back at our field notes, we believed that we had enough sightings and data that were essential in highlighting the uniqueness of this landscape, its flora and fauna as well as the different anthropogenic changes that we were witnessing before our eyes during our stay. More than that, we also wanted to keep Rajaji at par with other Protected Areas such as Corbett. As of now, the park has received more tourists as compared to 2021. Safari vehicles have increased, as well as sightings!

Amit Kumar, Ph.D., Faculty, Wildlife Institute of India

ADHITH SWAMINATHAN

IN THE SAME BOAT

By Bittu Sahgal

What is man without the beasts? If all the beasts were gone, man would die from a great loneliness of spirit. For whatever happens to the beasts, soon happens to man. All things are connected.

– Chief Seattle

The Andaman Sea is a magical slice of heaven on Planet Earth. Years ago, I had the privilege of exploring the mysterious forests and pure waters of Great Nicobar Island, below the 10^0 Channel. In the company of India's Coast Guard, with Mitali Kakkar and a team of crack scuba divers, we were on a *Reef Watch-Sanctuary* expedition to survey virtually unstudied waters and in eight days, we packed in 14 exploratory dives in waters teeming with life.

The late Jacques Cousteau – defender of our oceans, filmmaker, author and inventor of the aqualung, had earlier christened these waters the Sea of Sharks. In the event, though we saw pods comprising hundreds of spinner dolphins, we did not see a single shark. Not surprisingly, however, we also saw scores of confiscated Indonesian power boats, but not one shark. They had virtually all been slaughtered by poachers to feed the insatiable global demand for shark fin soup.

Years later, I will never forget a quiet walk along a silver beach, on a full moon night, where Mitali and I literally felt the sand move under our feet. Some two months earlier, unseen by human eyes, a large number of giant female leatherback turtles *Dermochelys coriacea*, currently threatened with extinction, had come ashore to deposit their billiard ball-sized eggs on a beach they must have used for millions of years. Soon one, then two, then hundreds of tiny turtle hatchlings emerged from their nests to make their laborious way across the silver sands towards the glittering sea from whence their ancestors came. As the tiny hatchlings made their way to their ocean womb, neither Mitali nor I said a word as tears of pure joy, triggered by awe and sheer wonder rolled down our cheeks.

Over a decade later, as I sit writing out these words, I wonder how a cabal of powerful, but ecologically ignorant, planners are willing to sacrifice such miraculous life forms in the name of national security and global economics. The words spoken by my lifetime hero, Jacques Cousteau, in defence of our water world, ring louder in my head than ever before:

"***The sea, the great unifier, is man's only hope. Now, as never before, the old phrase has a literal meaning: we are all in the same boat.***"

Sanctuary Asia

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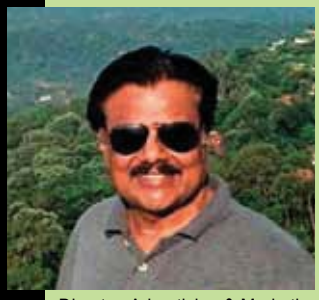

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Trees for life