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Distributors:

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Colo Venture (Mumbai) Tel.: 9324069403

Ria Enterprises (Mumbai)
Tel.: 9930155660 / 9820055660

Tinnu International (Ahmedabad)
Tel.: 9819122662

Kirti General Stores (Pune) Tel.: 9822242524

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January-March, 2016

Cover: **Quaker**
Neopithecops zalmora
Rahul Rao

Published and printed quarterly by Dr. A.M. Bhagwat for the Bombay Natural History Society, Printed at Akshata Arts Pvt. Ltd., Lower Parel, Mumbai.
Reg. No. RN 35749/79, ISSN 0441-2370.

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FEATURES

Champions of Swachh Bharat

Swachh Bharat is a remarkable programme that our country requires desperately. I take this opportunity to congratulate the Government of India for taking this bold initiative. The scale of this problem is enormous; look at the amount of garbage we see all around us, be it cities, villages, forests, or oceans. I am not going to dwell on this urban or rural syndrome of being accommodative of living in filth, I am going to dwell on the unsung ambassadors of Swachh Bharat that exist in our oceans.

DEEPAK APTE

Uca sp.

It was a winter morning, while searching cryptic species on the sandy shores of Konkan, when I encountered an army of small sand crabs *Dotilla myctiroides* and Fiddler Crabs *Uca* sp. During low tide these small crabs start marching on the open sand/mud flats, gleaning organic debris, consuming it and thereby performing the role of nutrient recyclers. How efficient are these natural wonders is beyond imagination. And it is not a one-time activity; the crabs have indulged in this activity day and night uninterrupted for millions of years, generation after generation.

Sand mining today in India is of epic proportions. Be it river, lagoons, estuaries, creeks, or sandy shores, there are tell-tale stories of the scars left by sand mining. One of the fastest growing economies in the world, India faces the daunting challenge of balancing economic prosperity with environmental and social challenges posed by activities such as sand mining. Sand mining means denuding shorelines that have important buffer and nutrient functions in an ecosystem. By not recognizing this role we are not only digging our graves by flattening sand dunes, but are actually inviting the sea to invade our homes (in light of climate change and sea level rise), we are also destroying the home of the natural ambassadors of Swachh Bharat.

DEEPAK APTE

Dotilla myctiroides

Take another case. Sea cucumbers, many call them ugly and slimy creatures, but for me, they too are ambassadors of Swachh Bharat. Sea cucumbers have an incredibly important role in maintaining a healthy ocean. They clean and fertilize the sand, just like earthworms clean and enrich our soil. These animals, like crabs, forage on sandy shores, clean sand of organic debris and release nitrogen rich faeces. When sea cucumbers ingest sand, the digestive process in their gut increases the pH of the water in the reef where they defecate, countering the negative effects of ocean acidification. The sand passed through a sea cucumber's gut is clean and contains bacteria, which enrich the ocean's health.

Fortunately, all sea cucumbers are protected under the Wildlife (Protection) Act, 1972. However, the irony is that today we are debating the need to delist sea cucumbers from the Act so that we can harvest them for export. The argument put forward is that sea cucumbers are very common. Well, this may be true for one place and not all species are common and cannot be applied universally. I hope people soon understand that we cannot put a price tag on everything. Also, knowing our law enforcement abilities, they are best left protected.

The real irony is that on one hand we invest in advanced technologies to treat and/or recycle garbage and launch campaigns like Swachh Bharat, while on the other, we destroy the natural systems that clean ecosystems much better than human technologies.

For me the tiny sand crabs and sea cucumbers are the real unsung ambassadors of the Swachh Bharat Programme. How long these ambassadors exist rests in our hands.

Deepak Apte

JAMES EATON

In search of Van Hasselt's Sunbird

Text: **Shashank Dalvi**

What really matters when one visits new and unexplored areas is meeting like-minded people. One meets old friends and makes new ones, and collects lots of memories to cherish for a life time.

Sighting of Van Hasselt's Sunbird was the icing on the cake of the author's 'Big Year'

I had been advised three weeks' rest after suffering a river rafting accident on the 1st of November, 2015. The doctor had pulled out five small pieces of concrete from my right heel. But after eight days of insufficient rest, I found myself boarding a late night flight to Delhi. I was facing a ticking clock; there were less than two months left and I had a lot of ground to cover to finish my 'Big Year'. This accident had already put me off schedule by a few days. I was attempting a 'Big Year' during which I was trying to see or hear as many bird species within Indian limits between 1st January to 31st December, 2015.

On the early morning of 12th November, I crashed at the arrivals lounge at Delhi airport. After a wait of a few hours, I was joined by my friend Ramit Singal. Ramit is an extremely talented young birder of India, and has travelled widely and birded across the country. We met in high spirits and looked forward with excitement to our week-long birding trip that would criss-cross the plains of Assam, foothills of Nagaland, and the 'rare' floodplains of Arunachal Pradesh ('rare' as there is a very small section of floodplains in this otherwise hilly state). The planned route was over 2,400 km. We had designed the birding route with specific target species for my 'Big Year'. I had already seen most of the birds on my list from north-east India. So I had to pick a few species scattered all over this vast region. I had resolved to not twitch birds (travelling to places just to see a single species) during my Big Year. The plan, therefore, was to choose certain areas where I would get to see birds in bulk. We started from

SHASHANK DALVI

Olive Bulbul was one one of the mega birds on my target list

SHASHANK DALVI

White-browed Piculet uses broken bamboo shoots to build its nest

the southernmost tip of Assam – an area that resembles the surrounding regions of Tripura, Mizoram, and even Bangladesh, rather than the typical floodplains of the state. The target list was short, but full of mega birds (very rare, in birder jargon) like Black-headed Bulbul *Microtarsus atriceps* and Olive Bulbul *Iole virescens*, Stripe-breasted Pied Woodpecker *Dendrocopos atratus*, and most importantly the tiny and beautiful Van Hasselt's Sunbird *Leptocoma brasiliana*.

Van Hasselt's Sunbird *aka* Purple-throated Sunbird has a very limited range within Indian limits. In fact, when the bird was photographed near Srirampur village, inside a Reserve Forest in Karimganj district, Assam by Dr. Vijay Ismavel on March 15, 2015, it was the first sighting of this species within India in recent times. When Dr. Vijay and Praveen J. went digging into past records, they realised that the bird was far rarer than was initially believed. It is likely that most of the collection records of this sunbird may have come from across the border of Bangladesh, when India was one big country under British rule. Sylhet district of Bangladesh is the only stronghold of this species in the Indian subcontinent. The museum specimens of this species do not provide the exact locations where they were collected. I had tried but failed to see this bird in Tripura in May 2014. Unsurprisingly, when I heard the news of this sunbird from south Assam my eyes lit up – I could attempt to see not two (both bulbuls) but three of my target species at one go.

However, getting to these locations was much more challenging than I had expected. We landed at Guwahati Airport and headed straight to the ISBT (inter-state bus terminal). Here we boarded an overnight bus to Patharkandi where Dr. Vijay was

supposed to pick us up. We deliberately took a longer route to reach Patharkandi via Meghalaya, rather than the shorter route through Karbi hills, which are highly infamous for late night robberies on buses and trains. Ramit had faced one such unpleasant experience. The worst part of the 'longer route' was the travel on National Highway 44. This was by far the worst road I have ever travelled on. It was full of potholes and was extremely dusty. Some potholes were so large that a small car used to partially disappear into the depths of this so called National Highway. We finally reached our destination at Mukunda Hospital late next morning.

Dr. Vijay Ismavel had been kind enough to invite us to stay at his place and offered to take us to the spot where he had seen the bird in March. It was great meeting him, after all I had heard about him. Dr. Vijay and his wife had moved to Patharkandi from Chennai in the 1990s to run Mukunda – a leprosy hospital. This was during times when the socio-political situation in Assam was still risky. Ever since then, they have dedicated their lives to helping people. Dr. Vijay is the only surgeon in this part of south Assam and its neighbouring states. Hence, he attends to every possible emergency in the whole region. In his spare time, he documents the flora and fauna of this region, and has done an excellent job of it. He has recorded several rare species from insects to birds during the numerous local expeditions he has led in these remote and rarely explored habitats. It was on one such expedition that he had sighted Van Hasselt's Sunbird.

Coming back to the story, Dr. Vijay, Ramit, and I visited the nearby Hathikhira Tea Estate where we soon encountered birds, like the White-browed Piculet *Sasia ochracea*, Silver-breasted Broadbill *Serilophus*

SHASHANK DALVI

Black-headed Bulbul seen in small and localised range in Indian limits, also made their appearance

SHASHANK DALVI

Fifteen Ruby-cheeked Sunbirds in one go was yet another notable event of the trip

RAMIT SINGAL

The excitement of seeing Van Hasselt's Sunbird was somewhat marred by the sight of logged bamboos lying dead in what must have been an excellent grove

lunatus, Pin-striped Tit-babbler *Mixornis gularis*, Pale-chinned Flycatcher *Cyornis poliogenys*, Scarlet-backed Flowerpecker *Dicaeum cruentatum*, and Little Spiderhunter *Arachnothera longirostra*. We followed up the afternoon session with birding around Mukunda Hospital campus where we also found one singing Blunt-winged Reed-warbler *Acrocephalus concinens* and a Swinhoe's Snipe *Gallinago megala*. The latter is a notoriously difficult bird to identify visually, as it resembles the Pintail Snipe *Gallinago stenura*. Luckily both of us clearly heard the call of Swinhoe's Snipe when we accidentally flushed it. It was quite an unexpected addition to my year-list. These two birding sessions were a perfect warm-up for the next day's expedition.

We started in the dark and drove to Srirampur village, reaching our destination at dawn. We were welcomed by the locals who agreed to show us the way into the interior of the forest. The initial part of the trek wove through teak plantations, but soon we entered the beautiful lowland evergreen forests of south Assam Hills. As luck would have it, there was good bird activity in the morning and soon our ears were ringing with calls of Grey Peacock-pheasant *Polyplectron bicalcaratum*, Ashy-headed Green-pigeon *Treron phayrei*, 'Square-tailed' Drongo-cuckoo *Surniculus lugubris*, Rufous Treepie *Dendrocitta vagabunda*, and Grey Treepie *Dendrocitta formosae*. I noticed that three species of birds were dominating the whole forest – Grey-headed Canary-flycatcher *Culicicapa ceylonensis*, Pale-chinned Flycatcher, and Yellow-browed Leaf-warbler *Phylloscopus inornatus*. In the first fifteen minutes, we encountered regulars such as Black-crested *Pycnonotus flaviventris*, Red-vented *Pycnonotus cafer*, Red-whiskered *Pycnonotus jocosus*, and White-throated *Alophoixus flaveolus* Bulbuls. Soon we encountered my first target species – Olive Bulbul. These birds, just like Black-headed Bulbuls, have a very small and localised range within Indian limits. Both species are distributed only south of the river Brahmaputra. Olive Bulbuls are very dull looking birds, drab olive with a yellow tinge. We watched them feed in the mid canopy for a long time, before we finally decided to move ahead. We continued birding for the next few hours and I hobbled my way through undulating terrain, slowly enhancing our birdlist with species like Lesser Shortwing *Brachypteryx leucophrys*, Grey-throated Babbler *Stachyris nigriceps*, Brown-cheeked Fulvetta *Alcippe poioicephala*, White-browed Scimitar-babbler *Pomatorhinus schisticeps*, Black-breasted Thrush *Turdus dissimilis*, and Small Niltava *Niltava macgrigoriae*. Given our slow pace, Dr. Vijay soon outstripped us and was birding way ahead. At one extensive bamboo patch we were enticed by a call of what could possibly be the rare and local Stripe-breasted Woodpecker, but we couldn't locate it.

A little disappointed, we walked ahead to find that Dr. Vijay was waiting for us. He had found a Black-headed Bulbul in the time we spent looking for the woodpecker. The Black-headed Bulbul is a small brightly coloured bird with very short legs. The regular morph has a glossy black head and pale blue eyes tinged with pink, although a grey morph is also seen in this area. We spent ten more minutes watching this bird sitting motionless on a leafless tree and then continued on our way. Our main quarry was still elusive, had it disappeared from the face of the earth?

We had covered six kilometres through a patch of grassland, a long stretch of bamboo-covered ravine, a slushy stream and an undulating foothill forest. Finally, we reached the spot where Dr. Vijay had seen Van Hasselt's Sunbird in March. Meanwhile, we had seen 15 odd Little Spiderhunters, and an equal number of Ruby-cheeked Sunbirds *Chalcoparia singalensis*, three Purple-rumped Sunbirds *Leptocoma zeylonica*, and a lone Crimson Sunbird *Aethopyga siparaja*. We were getting frustrated and it was getting hotter every second. It was already afternoon and it was time to return. Dr. Vijay and other members of the expedition turned back. Ramit and I, however, decided to stay a little longer. The minutes passed and still there was no sign of the Sunbird. This was one of those moments when time moves slower than usual. We encountered more Olive Bulbuls during that wait. Slowly, 20 minutes turned into 40, and it felt like an eternity of searching, waiting and hoping. Reluctantly we decided to head back. A mere 30 m on, we finally heard an unfamiliar sunbird song. We ran back and started looking frantically for sunbird shapes in the canopy. There it was, flitting in the canopy, a tiny bright bird with iridescent copper-green crown and sides of neck,

RAMIT SINGAL

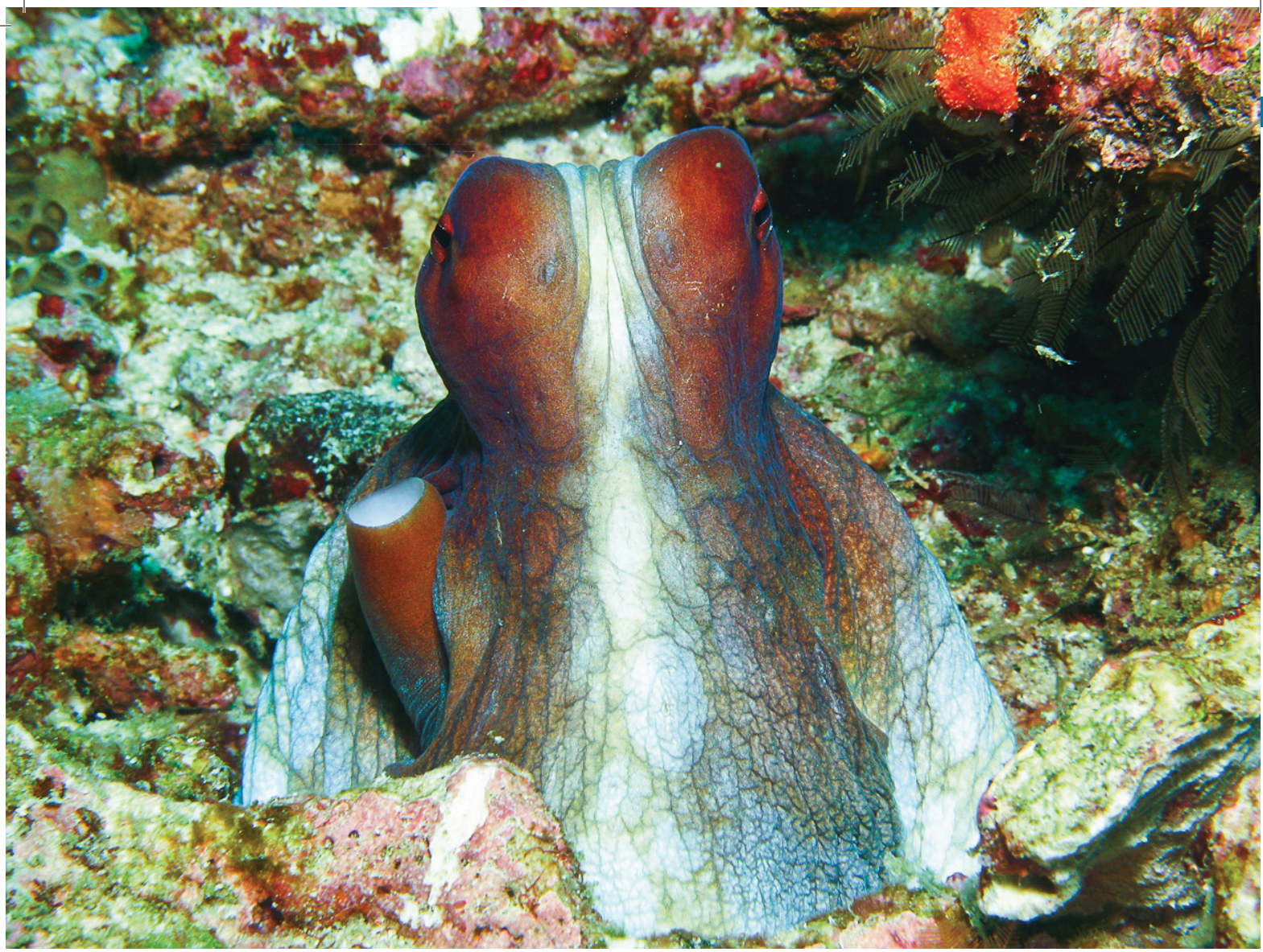
Wading through ankle-deep water was no easy task while trying to protect an injured foot

maroon mantle and scapulars, metallic green lower back, rump and upper tail-coverts with a black tail. I managed a couple of bad pictures, but somehow in all this action Ramit missed getting a good view of the bird. Luckily, after a few anxious seconds, we located a female of the species with dull yellow underparts and a broken white eye ring, incredible sightings in good light. The mission was finally successful. We gave high fives to each other and started our journey back through all the slush and mud. I had to keep my wounded foot dry to avoid infection, which was a bit difficult in that terrain.

Having successfully seen the Sunbird, the return journey to Srirampur village felt like no distance at all. However, on the way back through a different route we encountered a massive bamboo-logging site. From all directions, we could hear the sounds of bamboo being hacked (see images). By the time we reached Mukunda Hospital, we were completely tired and filled with mixed feelings. There was the excitement of scoring Van Hasselt's Sunbird (only the second sighting in recent times from the country) and at the same time there was the picture of thousands of bamboos lying dead in what must have been a flourishing and beautiful grove.

It was a brilliant trip overall. I managed to add about six species of birds to my yearlist which was kind of a big deal, as it is a bit difficult to add birds once you cross 1,067 species. However, more than just counting birds, what really matters is to visit new and unexplored areas and meet lots of people who are equally interested in birds. You meet old friends and make new ones. This was one such visit where I got to see new birds, I ventured into new areas, made new friends, and collected lots of memories to cherish for a whole lifetime. ■

Shashank Dalvi is an alumnus of WCS-NCBS Master's programme in Wildlife Biology and Conservation. He has received the Carl Zeiss Conservation Award for Amur Falcon conservation efforts in Nagaland. Recently, he was a part of the team which discovered the Himalayan Forest Thrush, the latest new species of bird to science.



Octopus:
The Intelligent Invertebrate

Text and Photographs: **Digant Desai**

Aristotle once wrote, "The octopus is a stupid creature, for it will approach a man's hand if it be lowered in the water." It's been a long time since then, and current studies prove otherwise. Researchers who study octopuses are convinced that these boneless animals have developed intelligence, emotions, and individual personalities. Their findings are challenging our understanding of consciousness itself. There are many videos on YouTube showing the behaviour of this intelligent creature that has three hearts, nine brains and blue blood, and lives underwater.

"Measuring the minds of other creatures is a perplexing problem" writes S.Y. Montgomery. "One yardstick scientists use is brain size, since humans have big brains. But size doesn't always match smartness. As is well known in electronics, anything can be miniaturized. Small brain size was the evidence once used to argue that birds were stupid — before some birds were proven intelligent enough to compose music, invent dance steps, ask questions, and do math."

Another measure of intelligence: you can count neurons. Unlike humans with a centralized brain with about a billion neurons, octopi have about 500 million neurons, which is 1/20th of what our brains have (**PLEASE CONFIRM VALUE FOR NEURONS**). But compare this to just 20,000 neurons that other family members in the same line like snails, clams, nautilus and other molluscs have, and one can deduce that the octopus evolved with probably the largest brain amongst all invertebrates. The brain of an octopus works like an Internet! Their CPU is only the size of a walnut, but each of their eight arms carries packets of neurons. This network enables an octopus to approach the power of one central brain. Researchers think each of the groups of neurons in the arms can carry out instructions independently and think for themselves. The suckers can attach to things, exert force, and even smell stuff.

Jennifer Mather, a Canadian biologist, has tossed toys into octopus tanks and watched as the octopi inspect them and puff them around with jets of water. They are playing, she argues. Clams do not play. Humans do. Mather is also the author of the new paper arguing for consciousness in octopi. She does not claim that they have full-blown consciousness like we do, but a simpler form known as primary consciousness. In other words, they can combine their perceptions with their memories to have a coherent feel for what's happening to them at any moment. Mather bases her claim not just on how octopi behave, but also on how their brains work. She even observed an *Octopus vulgaris,* the common Atlantic octopus, catch several crabs and return to its rock den to eat them. Satiated, it emerged, gathered four stones, shielded the den entrance and took a safe siesta. The strategy suggested qualities that weren't supposed to occur in the lower orders: foresight, planning, perhaps even tool use.

My experience as a marine photographer/diver has been an interesting one apropos the Octopus.

Over 300 species of octopi inhabit tropical and semitropical waters in oceans around the world

All octopi are venomous, but only one group, the Blue-ringed octopus, is known to be deadly to humans. This image is of the Blue-ringed Octopus observed for the first time in India around Havelock Island in the Andamans. The tiny the Blue-ringed Octopus, the size of a golf ball, has a poison so toxic and a bite can kill a human in minutes. Otherwise camouflaged and very difficult to find, once disturbed, it will flash bright blue rings as a warning to keep away.

For its colour palette, the octopus uses three layers of three different types of cells near the skin surface. The deepest layer passively reflects background light. The topmost may contain the colours yellow, red, brown, and black. The middle layer shows an array of glittering blues, greens, and golds. But how does an octopus decide what animal to mimic, what colours to turn? Scientists have no idea, especially given that these animals are likely *colour blind*. New evidence suggests a breathtaking possibility. Woods Hole Marine Biological Laboratory and University of Washington researchers found that the skin of the cuttlefish *Sepia officinalis*, a colour-changing cousin of octopi, contains gene sequences usually expressed only in the light-sensing retina of the eye. In other words, cephalopods — octopui – cuttlefish, and squid — may be able to see with their skin!

On one dive I found an octopus resting on a rock. On approach it would not move away like many do, but just changed its colour to a reddish maroon (see image alongside) as if displaying a warning, and as I moved away it changed colour to resemble the surroundings. I played this game a few times, thoroughly enjoying myself, and each time I got too close, rather than fleeing it flashed red. On another night dive, an octopus squeezed away in its den and then curiously came out to catch a glimpse of my camera and feel it delicately with its suckers. Probably realizing that this has nothing to do with an interesting meal, it took some rocks, pulled them towards the entrance of the den and went inside with just an eye popping out.

A Blue-ringed octopus, observed for the very first time in India by me around Havelock in the Andamans, was a real pleasure to watch. Resting peacefully in dull colours, on closer approach it would swim off, flashing bright blue rings. I have seen an octopus that took the shape of a rock, moving ever so slowly in plain view. My guess is, predators cannot see or attack it, as the movement combined with its perfect camouflage gets lost in the dappled light in shallow water. I observed a mimic begin to take the shape of a flounder, and one tiny octopus had made a home out of a sea shell, squeezing out of sight inside the hard outer shell for protection. But my most harrowing experience was in the Maldives. After finishing a dive I saw an octopus during our safety stop in about four metres of water. It curiously came up and started feeling my camera and hands. This made me feel really special, as a marine denizen was interacting with me in the wild. Imagine my surprise when one sucker **[ARM?]** went up to my mask and face and another behind by neck, bringing the octopus right up to my chest. Panic set in for a brief moment. It was quite impossible to pull its arms off, as I had a camera in one hand and if I pulled an arm off, another would take its place. My relief was immense when the dive master came up and slowly removed each arm, and the octopus went off, having had a good scare day. I once saw an octopus in Lembeh, Indonesia, that was scuttling away holding two coconut shells. I tried taking an image but it quickly clamped its arms shut. This was just amazing behaviour. My regret was I did not get the shot.

So coming to the question, are octopi really intelligent? Well yes and no. YES, octopi have shown signs that they can learn, and process complex information. But NO, it would be a mistake to try and give octopi an IQ or EQ score. They are definitely not dumb and have gathered this so-called intelligence through millions of years of evolution in conditions very different from those under which our brains evolved. Octopi evolved boneless bodies that they control with water pressure, while we control ours with bones. The differences are just too many.

There is much to be discovered about this complex denizen of the ocean, which has a short lifespan of four to five years. Take a minute to think, primates like chimpanzees and other mammals like dolphins are known to be

Cephalopods, the class of Mollusca in which scientists classify octopi, squid, cuttlefish, and nautili, can change colour faster than a chameleon. The class Cephalopoda, which means "head foot", are related to bivalves (scallops, oysters, clams), gastropods (snails and slugs), scaphopods (tusk shells), and polyplacophorans (chitons).

Cephalopods are found in all of the world's oceans, from the warm water of the tropics to the near freezing water at the poles. They are found from the wave swept intertidal region to the dark, cold abyss. All species are marine, and with a few exceptions, they do not tolerate brackish water.

Cephalopods have inspired legends and stories throughout history and are thought to be the most intelligent of invertebrates. Some can squeeze through the tiniest of cracks. They have eyes and other senses that rival those of humans.




Octopus have numerous strategies for defending themselves against predators. Using a network of pigment cells and specialized muscles in their skin, octopi can almost instantaneously match the colours, patterns, and even textures of its surroundings. Predators such as sharks, eels, and dolphins swim by without even noticing them. Camouflage is the first line of defence but if that does not work, an octopus will release a cloud of black ink to obscure its attacker's view, giving itself time to swim away. The ink even contains a substance that dulls a predator's sense of smell, making it harder to track the fleeing octopus. Fast swimmers, they can jet forward by expelling water through their mantle. And their soft bodies can squeeze into impossibly small cracks and crevices, where predators cannot follow. Finally when nothing works, an octopus will lose an arm to escape a predator's grasp and regrow it later with no permanent damage. They also have beak-like jaws that can deliver a nasty bite, and venomous saliva, used mainly for subduing prey.

The diet of octopus consists of small crabs and scallops, besides some snails, fish, turtles, crustaceans (like shrimp), and other octopi.

intelligent. Even the clever raven, crow, and cockatoo are at least vertebrates. But a human's last common ancestor with the octopus was a worm-like creature with eyespots living about 700+ million years ago. So this invertebrate *sans* bones has come a long way in the evolutionary patterns showing cognitive and learning behaviour and skills. Learning to open child-safe bottles in less than an hour, rejecting stale food in labs, and solving maze puzzles, who knows what they will learn next.

More reading:

'Octopus: The Ocean's Intelligent Invertebrate' by Jennifer A. Mather, Roland C. Anderson, and James B. Wood.

Digant Desai is a passionate marine photographer and diver.

BACK FROM THE BRINK

Text: **Rakesh Vyas, Ravindra Singh Tomar and Manish Arya**

The first otter seen near Kota in Chambal after 30 years

IN MOST QUARTERS OF INDIA, the otter is most commonly referred to as a Water Cat (UdBilav) or Water Man (Jal Mansya), but not a Water Dog like in Europe. The Smooth-coated Otter apparently has a wide distributional range, but it is reportedly abundant nowhere. Small populations are barely surviving environmental pollution and habitat loss, in pockets fragmented by man-made or natural barriers. Chambal river in south-east Rajasthan was a stronghold of the Smooth-coated Otter until about early 1960s. Historical and word of mouth accounts shared by senior wildlifers conclusively tell that the construction of dams on Chambal river in the 50s and early 60s of the last century was a fatal blow to the existence of otters in western Madhya Pradesh and south-east Rajasthan.

The otters in Hadoti and eastern region of Rajasthan are known as Jal Mansya, probably because of their playful nature, curiosity, baby-faced charm and family bonding. They were found throughout the length of the river between Rampura/Bhanpura in Madhya Pradesh to Kota and further up to Dhaulpur in north Rajasthan.

Smooth-coated Otter is an inhabitant of rocky and sandy river banks and lakes where shallow water makes feeding, extending over 20–30 km upstream. During our research over the last 20 years, we were told by knowledgeable individuals like the late Chanchal Singh of Kunhadi that they used to watch families of otters frolicking in the Chambal from their palace situated on the western bank of the river at Kota. The otters were equally common on the eastern bank near Garh Palace and Brajraj Bhavan in Kota and all along its route up to Pali ghat in Sawai Madhopur district. During our survey,

This confident male otter was leading a romp of female and young otters

housing, and breeding convenient. Chambal river in the days prior to the construction of dams was a fast-flowing shallow river, barring the monsoon months. The gradient of almost one metre per kilometre caused it to flow rapidly from Malwa plateau to Hadoti plateau and further to the Gangetic plains. Construction of the Gandhi Sagar dam in Madhya Pradesh, and Kota Barrage in Rajasthan, began in the mid-50s, and by 1962 the reservoirs were created and the free flowing Chambal had been harnessed. The work on Rana Pratap Sagar and Jawahar Sagar dams also started within a decade and the Chambalgot converted into four large pools

we learnt that otters also inhabited some of the large village ponds near Rampura, Bhanpura in Madhya Pradesh, and Rawatbhata in Rajasthan. The otters of Chambal river had disappeared from Kota and Rawatbhata by 1965. Village elders and knowledgeable persons from Kota vouch for their disappearance around that period. It is possible that a remnant population survived in the remote and distant backwaters or feeder streams of Gandhi Sagar Dam.

After a gap of about three decades the otters reappeared in the catchment area of Gandhi Sagar dam in 1992; we saw them during a biodiversity survey of Gandhi Sagar in

RAVINDRA SINGH TOMAR

Inquisitive but not scared – otters looking at a boat

1998. The water level in the dam was extremely low and we found four otter families comprising 15 individuals, very close to the embankment. They had found the small stream beds in the catchment of the dam suitable for living, as the water level did not vary much and for most part of the year these streams became shallow stagnant pools or thin lines of flowing water. Around the same period, we received information that a village pond close to the back waters of Rana Pratap Sagar dam had a family of resident otters. We found enough proof of their presence, but never saw them personally. A decade went by before we got conclusive proof that the otters have re-established themselves in the backwaters of the dam. Since 2005, we have conclusive sight records and photographs to show their continuous presence in the area and increase in their numbers.

In the winter of 2010, we began to receive stray reports that someone had seen otters in the backwaters of Kota barrage near Akelgarh. The Chambal loops around this area and three seasonal streams from the plateau land join it to form deep gorges. The area is covered with protruding rocks, dense vegetation, and forms a safe haven for a number of species of animals and birds. The Eurasian Eagle-owl, Brown Fish-owl, Egyptian Vulture, Grey Heron, and Woolly-necked Stork breed regularly in this area and hatchlings of Marsh Crocodile also find a safe haven. On January 23, 2011, we could see and photograph a family of four otters swimming freely. They were not unduly disturbed by the approaching boat and only on closer approach climbed the bank, and unable to suppress their curiosity looked back at us. After a while they relaxed and lay down on a rock right

RAVINDRA SINGH TOMAR

The otters have made a comeback, but will we let them stay?

in front of us. Their sightings have been regular since then, but more frequent in winter. It seems that during summer they spend most of the time in the cool environs of their subterranean homes. In subsequent years, this otter family moved closer to Kota city and established its winter home in another stream close to the barrage. Fortunately there are now at least two families of four and six individuals close to the Thermal Power Plant and two more pairs around Akelgarh. The otters were seen at Kota after almost 50 years, and this further emphasizes the point that habitat protection is the most crucial factor in conservation action. Besides the habitat alteration due to the dams, the area had gone through a lot of illegal mining, wood felling, and fishing. It was so rampant that a concerted effort with the Forest Department for almost two years between 1998 and 2000 was needed to put a stop to all illegal activities. The increased level of safety led to the reappearance of all wild animals in the area.

This 'back from the brink' story is not as simple as it may appear in the preceding paragraphs. It needed a lot of adaptation on the part of the otters and a tenacity for survival. The otters found the backwaters and stream beds a suitable alternative to their regular home on the banks of the river. They tenaciously fought for their share of food in the face of large-scale fishing in Gandhi Sagar and Rana Pratap Sagar dams and illegal activities in the backwater of Kota barrage. The otters have made a comeback and now it is our responsibility to keep their habitat clean and safe. ■

Rakesh Vyas is a conservationist and amateur ornithologist. He has written books on the birds and wildlife of Rajasthan.

Ravindra Singh Tomar is active in the field of wildlife conservation and advocacy for over 20 years. He was honorary wildlife warden of Kota district.

Manish Arya is a widely travelled wildlife photographer and conservationist.

Pratibha Pande
(1954 – 2016)

Pratibha Pande, a member of the Governing Council of BNHS passed away after a protracted illness over the last two years, on 17th March 2016. Pratibha had served on the Executive Committee several times in earlier years and her forthright views and commitment to causes of importance always made her a valuable member of our apex body. She was also generous in her efforts to help BNHS to raise funds. Pratibha's two children Madhvi & Vinayak looked after her through her unfortunate illness and our thoughts go out to them at this time. May her soul rest in peace!

Homi R. Khusrokhan
President, BNHS

Pratibha Pande: In Memory

In my nearly four decades of environmental work, it would be hard to think of someone more fun-loving, larger-than-life and a 'lets-do-it' attitude than Pratibha Pande. That she has left us at an age short of 62, suggests there is something deeply unjust in this world.

I first met Pratibha when she was introduced to a bunch of us who had set up Kalpavriksh in 1979, by our member Shekhar Singh. With her ever-readiness to zoom off for some birding trip, and obvious passion for environment (not to mention her penchant for plying us with endless culinary treats), she quickly became a core part of our activities. In the mid-1980s I joined her and Shekhar at the Indian Institute of Public Administration (IIPA) where they had initiated a project to study and profile India's protected areas. From then to the mid-1990s, this work took us to some of the country's most beautiful and important natural sites. As a co-author of the series of books emerging from it, Pratibha contributed not only in terms of text and analysis but played the unique role of map-maker and illustrator. In both she excelled. As map-maker she was a perfectionist, sometimes driving Shekhar and me up the wall because some contour line was not quite to her liking, while we were restless to get the book printed! One lasting memory is of Pratibha hunched up on the map table, cursing some state government or the other for providing her inaccurate maps that fitted no toposheet! Even more remarkable were her line drawings of animals and landscapes, they brought alive the publications like nothing else could. Then and later Pratibha exhibited a number of her drawings on wildlife, and even illustrated some Indian stamps.

In the 2000s she was part of some government committees on wildlife issues, and while her views on people-wildlife relations may not have quite been in sync with mine and others in Kalpavriksh, I have no doubt that she made important contributions. She was also instrumental in influencing decisions to strengthen protection of areas such as Sultanpur Bird Sanctuary in Haryana. Her detailed and painstaking documentation of protected areas and their issues in Maharashtra, brought out after we had all left IIPA (by BNHS), has I hope helped the state government to systematize its approach to their conservation. She was also generous in her efforts to help BNHS through some of its resource crunches, as a member of the governing board.

I last spent some quality time with her at a Kalpavriksh annual meeting in Pench, in 2007, subsequent meetings being very brief. Holding a meeting anywhere outdoors was a hazard with her around, as any passing bird would be an occasion to disrupt it, and when scolded, she just laughed good-naturedly! That's the way I remember her, that broad smile, that hearty laugh, that infectious enthusiasm for the good things in life. I dare say I speak for all those who worked and tripped and dined with her, that we will miss her dearly.

Ashish Kothari
Kalpavriksh

An old Ornithology book in Urdu in the BNHS Library

I have been a member of BNHS for the last three years. Having always had an interest in wildlife, I occasionally visit the library in Hornbill House, which is located opposite my work place. During one such visit, I came across an old book on ornithology in Urdu, and being proficient in the language, I went through the book.

On perusal, I was surprised that the publication, *Sair Parind* (Wanderings with Birds) was published 119 years ago (1897). The author, Malik Qutubuddin Saheb was a British Government official serving in Sialkot (now in Pakistan), and held the post of Pensioner Extra Assistant Commissioner. This book was published by Ghulam Fasih Qadir Malik, Punjab Press, Sialkot. The author at the start of the book mentions that it is the first book on ornithology in Urdu. The book, priced at 50 paise, carries a statement asserting that the rights to the book lie with the author as per section 20 of Copyright Act 1847, and also mentions that 1,000 copies of the publication were printed.

The book runs into 464 pages under 10 chapters. It has a number of illustrations in black and white, all drawn by the author. The names of birds given are those used in Persian, Punjabi, Sindhi, and Urdu. The English and scientific names of the species are not given, and this (besides the book being in Urdu), could be the reason why the publication went unnoticed in Indian ornithological history documentation (discussed further on). Chapter 1 dwells on the resident and migratory birds of the Sialkot, Ambala, Jalandhar, and Amritsar areas. Chapter 2 is on the classification of birds. Chapter 3 gives an account of 32 species of birds, and deals with various techniques used for hunting or trapping of birds.

(L-R): Title and Imprint pages of the book

After going through the interesting and very old book, I spoke to the Librarian Ms. Nirmala Barure, telling her of the significance of the book, the need for additional efforts to ensure its preservation, and the need to highlight its existence in the BNHS's library. In response, she immediately shifted the book to the air-conditioned Reference Section of the library. She also advised me to consult Dr. Ranjit Manakadan, Assistant Director, to discuss the find. Dr. Manakadan was extremely interested in the find, and after checking literature and online databases on the history of Indian Ornithology and consulting with others, informed me that this publication had not been mentioned, and its existence needed to be highlighted, and asked me to publish a note on the same – the genesis of this note.

Through this note, Indian birders will get to know of the existence of this book published in 1897, which would, if I am not wrong, make it the first 'modern' book in Indian ornithology to be published by a 'native'. I also wonder how many copies of this publication still exist in the world – the one in the BNHS is in excellent condition. If this is the only one, or there are very few other copies, then this book could also be valuable for ornithology. ■

Saeed V. Baig
Maharashtra

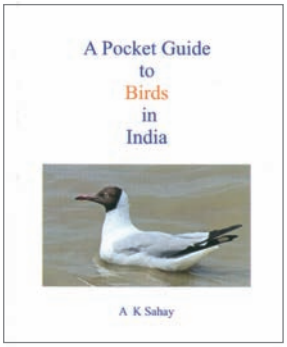
Dying Neem Trees Recovering

I had written about the dying Neem trees in the Madurai area and between Palni town and Coimbatore in the January-March, 2015, *Hornbill*. All the trees are now recovering and I am pretty sure that the rainfall this year has raised the water table to a level that is giving the trees a new lease of life. So far, I have not seen a dying Neem tree on the plains and they are all recovering branch by branch. ■

Pippa Mukherjee
Tamil Nadu

Reviewed by: **Asif N. Khan**

A Pocket Guide to Birds in India
Author: A.K. Sahay
Published by: Balaji Publishing House, Noida.
Size: 14 x 10 cm
Pages: 120
Price: Not mentioned
Paperback



A POCKET GUIDE TO BIRDS IN INDIA by A.K. Sahay is a small and handy book with good images. The beginning of the book gives a brief introduction to birds in India and a list of the top 10 birding areas, followed by a list of prominent bird groups in India. Apart from this, the book does not provide any more information regarding birds.

Each of the 195 bird images has only two labels: the common name of the bird and the photographer's name. The images of juvenile birds are not labelled as 'juvenile', and create confusion, since the juvenile and adult of some bird species differ in appearance, for example, Bronze-winged Jacana on page 49. Some of the photographs appear stretched or compressed possibly due to incorrect resizing. The image at the bottom of page 94 has been incorrectly identified as the Asian Pied Starling; however, the bird in the picture appears to be Pied Thrush (*Geokichla wardi*), and the Citrine Wagtail (page 114) has been misspelled.

Apart from a few mistakes, the book has good pictures and is pleasant to browse through, but it is not recommended for birders looking for a basic field guide. ■

About the Cover

For most of us, butterflies and flowers go together, as butterflies are supposed to get their nutrition from flower nectar. But flower nectar, though rich in sugar, lacks some essential nutrients like certain mineral salts and amino acids required by butterflies. To get these "other" nutrients, adult butterflies have to feed on a wide variety of resources ranging from rotting overripe fruits, animal dung, urine, bird droppings, human sweat, dead crabs, to other dead animals (carrion). Different species are known to prefer different food sources. The act of feeding on this wide variety of resources for essential nutrients is mainly performed by males. The adult males need these extra nutrients in the form of salts and minerals to improve the viability of the female's eggs. When butterflies mate, these nutrients are transferred to the female.

In this image, Quakers are seen feeding on dung to obtain mineral salts for nutrition. ■

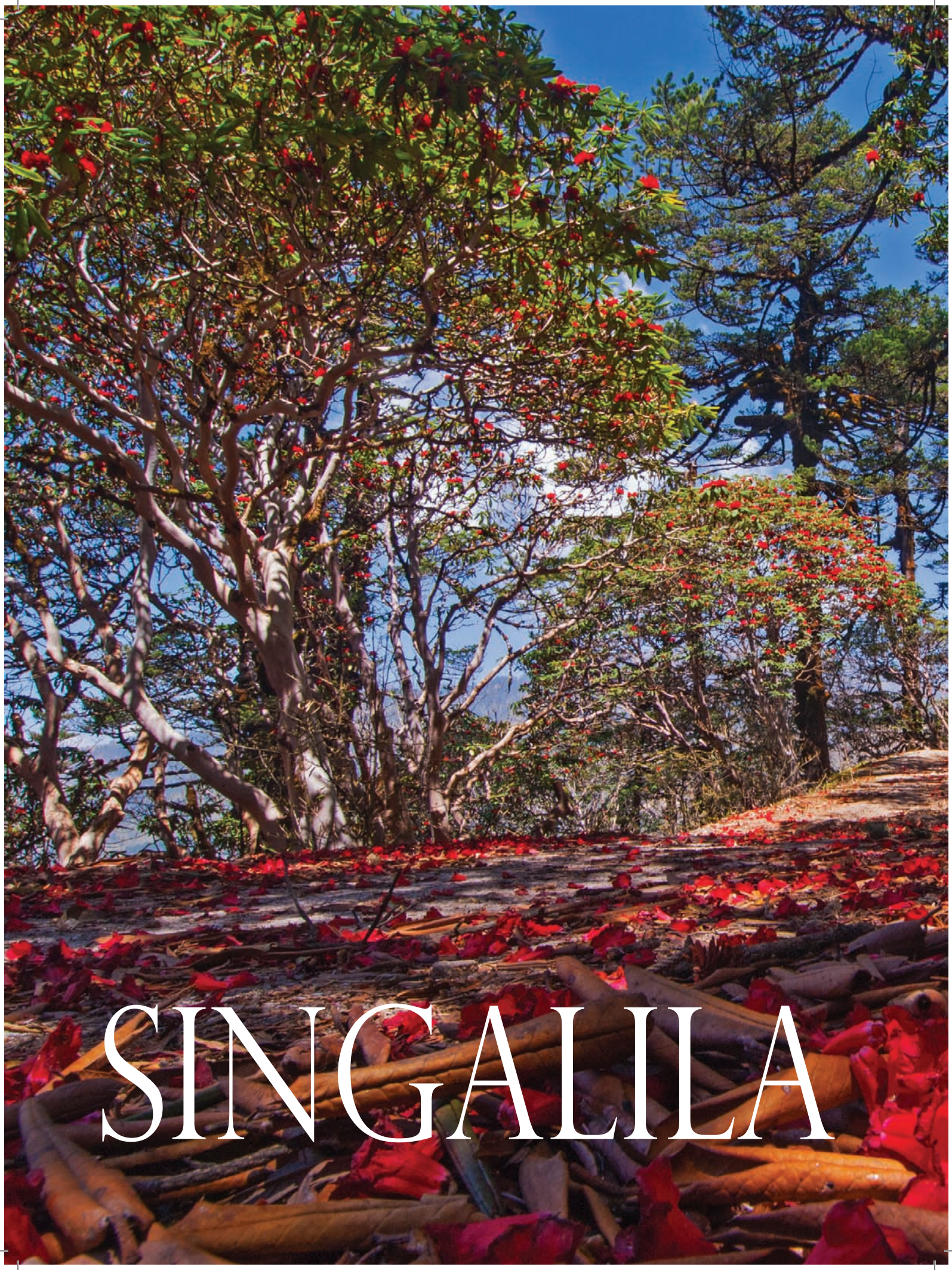
About the Poster

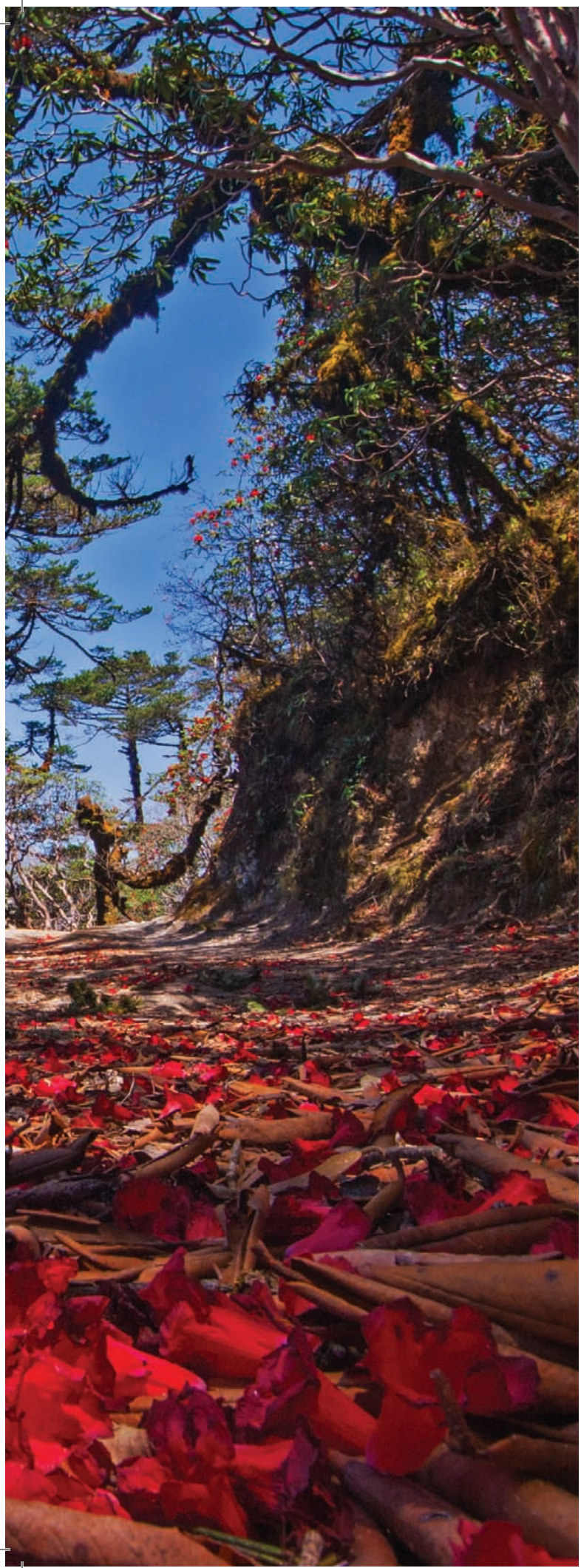
This photograph of a Rose-ringed Parakeet *Psittacula krameri* attacking a Monitor Lizard *Varanus bengalensis* was taken at Keoladeo National Park, Bharatpur. Aggressive behaviour in parakeets is usually witnessed when their eggs or young are vulnerable to predators. In this particular case, a pair of parakeets was fiercely attacking a monitor lizard that ran for cover. The chase continued for two minutes after which the lizard escaped into a bush; the parakeets waited for long, on a tree, possibly to ensure that predator did not return.

Social defences are not uncommon in parakeets. In the December 2012, *Hornbill* an article '*A Survival Story*' by Asif Khan talked about a group of parakeets trying to save one of their kind from a monitor lizard. ■


RATHIKA RAMASAMY


Rose-ringed Parakeet
Psittacula krameri
Monitor Lizard
Varanus bengalensis


SINGALILA



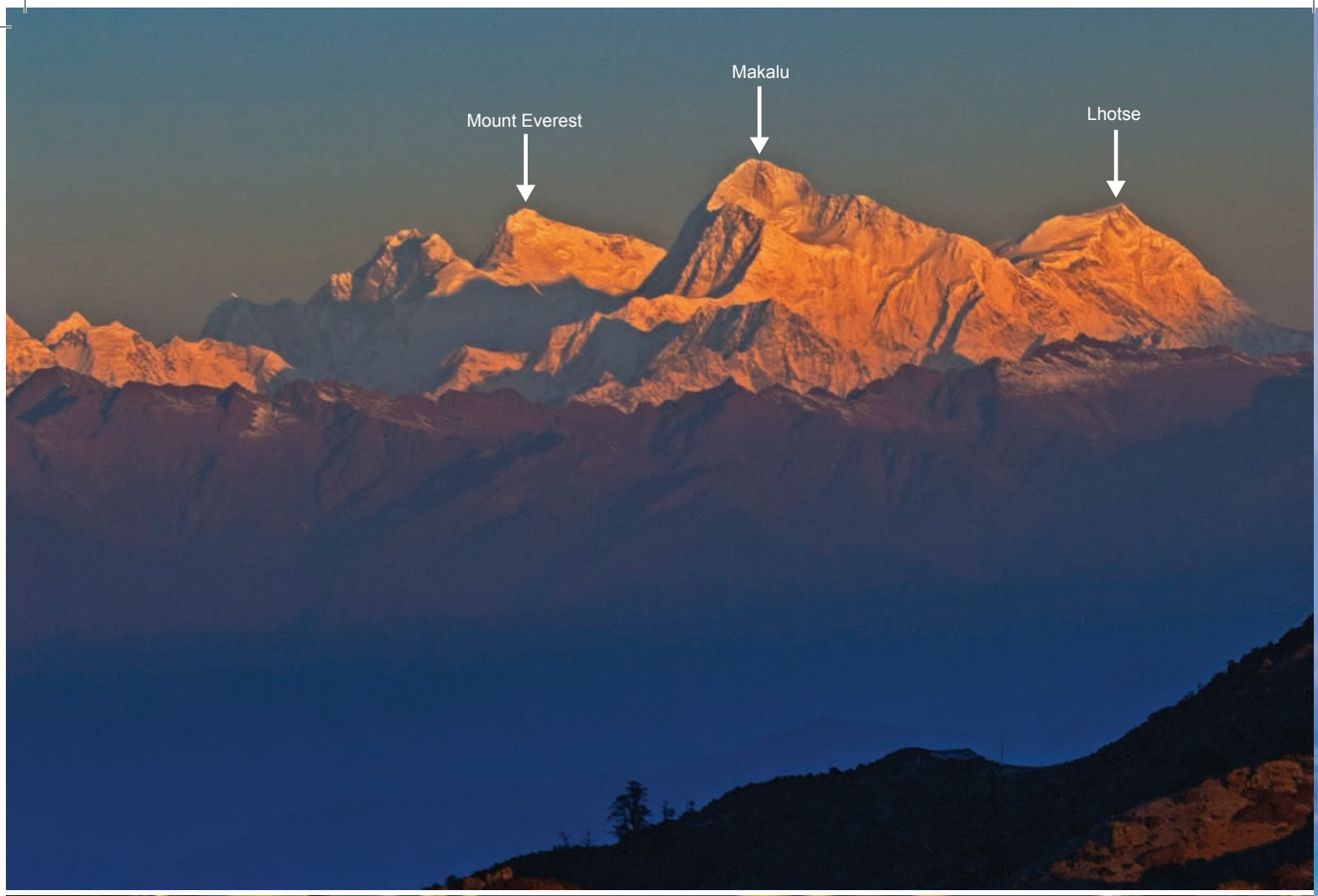
Dhritiman Mukherjee is a professional nature photographer. He has been awarded, amongst others, Carl Zeiss Conservation Award – 2013 and Royal Bank of Scotland Earth Hero Award - 2014 for inspiring people to preserve and protect critical ecosystems through photography.

Text and Photographs: **Dhritiman Mukherjee**

I have been visiting Singalila National Park in Darjeeling district of West Bengal since 1994 and have a long emotional connect with the area. My first trek was at Singalila. It was Singalila that hooked me for life to the outdoors and adventure. My first two hours of trekking in the unfamiliar landscape of the Eastern Himalaya left me speechless, amazed, and more than surprised. Since 1994, I have visited Singalila more than 20 times. At times it is a short trip of 3–5 days, while sometimes it is a 40-day long trip. But this place still manages to amaze and surprise me like it did on my first visit. Singalila is one of my most favourite wildlife destinations, probably my first love!

Up to 2000, whenever I visited the area, it was for its landscape, environment, and trekking. But when I started birdwatching and wildlife photography, I rediscovered the place as one of the best destinations for birding. And now also the best place for viewing Red Panda in the wild. It is a very good place for spotting pheasants, especially Satyr Tragopan and Blood Pheasant. Other hill birds are common. Among mammals, besides the Red Panda, one can spot the Yellow-throated Marten, Hoary-bellied Squirrels, and sometimes the Himalayan Black Bear.

One interesting feature of this Park is Sandakphu – the highest point of West Bengal state. One can see four of the fourteen eight-thousander peaks on our planet: Everest (1st - 8,848 m), Kanchenjunga (3rd - 8,586 m), Lhotse (4th - 8,516 m), and Makalu (5th - 8,481 m). In fact, one can get a magnificent view of Kanchenjunga from most part of the Park. Another interesting part is that one can travel the area in a 1954 Land Rover.



Coelogyne **sp.**

Monk's Hood flower *Aconitum* **sp.**


Blood Pheasant

Red-headed Bullfinch

Black-faced Laughingthrush

Oriental Turtle-dove

Red-billed Leiothrix

Fire-tailed Sunbird


Red Panda

Hoary-bellied Himalayan Squirrel

Land Rover – 1954 model

Where a trail ends in death

Text: **Dipanjan Ghosh and Sreeparna Ghosh**

A few months ago, I read with immense sadness news in an Indian daily (Associated Press) stating "Seven elephants, including two calves, have been killed by a passenger train in eastern India, the worst crash of its kind in recent memory, according to authorities. Ten other elephants were seriously injured and the death toll could rise, said Mr. Hiten Burman, forest minister in West Bengal. The train was travelling at 50 km speed through the Chapramari Forest when it struck the herd of forty elephants crossing the tracks on Wednesday at dusk. The herd scattered, but returned to the railway tracks and stood there for quite some time before they were driven away by forest guards and railroad workers who rushed to the spot after the accident."

The abovementioned incident is not an isolated situation, and in fact, elephants are being killed by speeding trains in North Bengal at regular intervals. According to a report, at least 50 elephants have been killed by trains since 2004 along this stretch of railway in West Bengal. This article dwells on the causes, present situation, and probable ways to stop killing of our heritage animal.

The Natural Abode

The prime elephant-human conflict area in this article is the Dooars (or Duar) of West Bengal and Assam, situated at an altitude of 90 m to 1,750 m and encompassing an area of about 8,800 sq. km. Dooars are known as *terai* in Nepal and northern India. Geographically, they cover the flat to undulating areas of Darjeeling district, the entire Jalpaiguri and Alipurduar districts, and the upper region of Cooch Behar district in West Bengal; and the Dhubri, Kokrajhar, Barpeta, Goalpara, and Bongaigaon districts in Assam. The Dooars comprise dense natural forests, criss-crossed by rivers and their tributaries. The forests are of mixed types, comprising broad-leaf hill forests, montane wet temperate forests, subtropical dry evergreen and semi-evergreen forests, and tropical moist as well as dry deciduous forests. Sal *Shorea robusta*, teak *Tectona grandis*, mahua *Madhuca longifolia*, jarul *Lagerstroemia speciosa*, kusum *Schleichera oleosa*, shalmali *Bombax ceiba*, siris *Albizia lebbeck*, mango *Mangifera indica*, jamun *Syzygium cumini*, and gurjan *Dipterocarpus turbinatus* are the common trees of this belt. There are a number of wildlife refuges in the area, namely Manas Tiger Reserve in Assam, Jaldapara National Park, Buxa Tiger Reserve, Gorumara National Park, Chapramari Wildlife Reserve, and Mahananda Wildlife Sanctuary in West Bengal. The once pristine forest and grassland belts of this region have seen the onslaught of humankind over the centuries, and the terrain is now interwoven with tea gardens and dense human habitations. This region has a human population density of around 652 per sq. km.

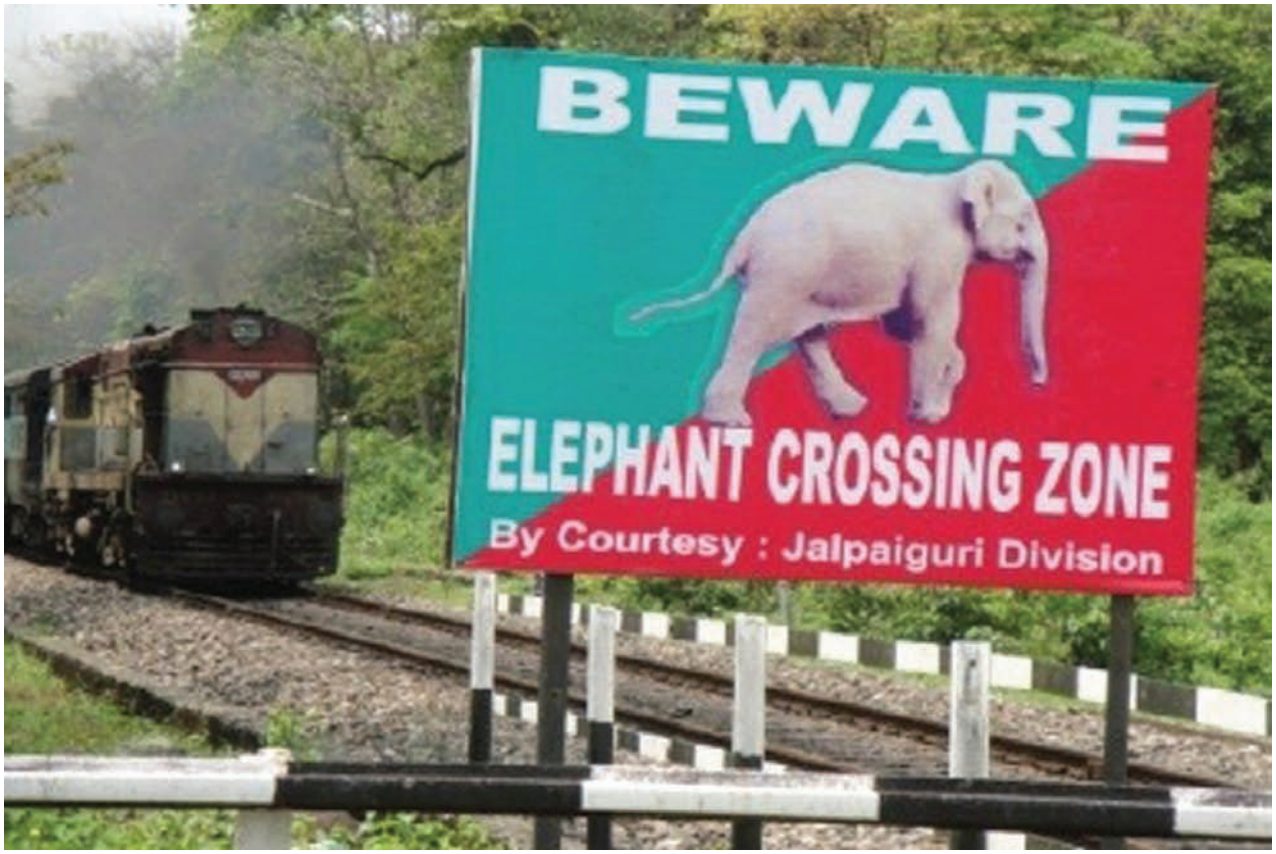
The Conflict Zone

The Dooars are home to many rare and endangered species, including the Asian elephant, tiger, leopard, rhinoceros, black bear, gaur, red panda, slow loris, and binturong. Around 700 elephants range across the Dooars

of Darjeeling, Jalpaiguri, Alipurduar, and Cooch Behar districts. The actual elephant habitat in this area is confined to about 2,200 sq. km. The entire area encompasses the stretch between the Mechi and Teesta rivers, comprising the forest areas under Kurseong Division and Wildlife Division I (Mahananda Wildlife Sanctuary). Within this area, the western Dooars stretch between the Teesta and Torsha rivers, comprising Apalchand Range of Baikunthapur Division, Jalpaiguri Division, Wildlife Division II (including Gorumara National Park and Chapramari Wildlife Sanctuary), Kalimpong Division, and Wildlife Division III (including the western part of Jaldapara National Park). The eastern Dooars stretch between the Torsha river and the Sankosh river bordering Assam and Bhutan and the forests of Wildlife Division III (consisting of the eastern part of Jaldapara National Park and Buxa Tiger Reserve). This area is also part of a critical intra-state and inter-state jungle corridor through which regular movement of elephants and other wildlife occurs.

The Siliguri-Alipurduar railway line under the North Frontier Railway in North Bengal has been the location of one of the highest elephant-train casualties in India. Siliguri Junction is connected to Alipurduar Junction by two separate railway lines, one of which, the northern, stretches over 168 km and **(and OR with? NOT CLEAR)** over 74 km of forests (about 44% of the track length). This track passes through three Protected Areas and the buffer zone of Buxa Tiger Reserve, including nine **sensitive established (NOT CLEAR)** elephant movement routes and reserve forests. The rail tracks pass through Mahananda Wildlife Sanctuary, forests of Kalimpong Forest Division, forest tracts of Tondu (Chalsa) between Chapramari Wildlife Sanctuary and Gorumara National Park, Diana Reserve Forest under

Reduced train speed would give loco drivers enough time to stop the train if elephants are crossing the tracks



DIPANJAN GHOSH

Despite measures taken to mitigate this hazard, elephant kill continue to happen in the Doars

Jalpaiguri Division, including Moraghat and Banarhat area, Jaldapara National Park, and Buxa Tiger Reserve. Along this 'killer tract', nine high risk railway sections that are most prone to wildlife crossing and accidents have been mapped by the Forest Department.

Mitigation Measures

Elephants have been closely associated with our religious and cultural heritage for centuries. India is home to between 50–60 per cent of all of Asia's wild elephants and about 20 per cent of domesticated elephants. India's wild elephant population was recently estimated at about 26,000. It is ironic that elephants are being killed by speeding trains in the Dooars regularly, even though they have been declared heritage animals in India, and Bholu the guard elephant is the mascot of Indian Railways.

Major elephant corridors in the Dooars of West Bengal

Mahananda-Kolabari in Wildlife I and Kurseong Divisions

Apalchand-Mahananda in Baikunthapur and Wildlife II Divisions

Apalchand and Gorumara-Lower Tondu in Baikunthapur and Wildlife II Divisions

Apalchand-Kalimpong via Targhera, Chel, Damdim / Sylee Tea Estate in Baikunthapur and Kalimpong Divisions

Apalchand-Bhuttabari [via] Meenglass Tea Estate in Baikunthapur and Kalimpong Divisions

Chapramari-Bhuttabari in Wildlife II and Kalimpong Divisions

Rethi-Central Diana in Jalpaiguri Division

Rethi-Moraghat via Banarhat in Jalpaiguri Division

Umchi-Rethi in Wildlife III and Jalpaiguri Divisions

Titi-Dumchi in Wildlife III Division

Buxa-Titi via Torsha/Rangamati in Buxa Tiger Reserve and Wildlife III Divisions

Buxa-Titi via Beech/Barnabari Tea Estate in Buxa Tiger Reserve and Wildlife III Divisions

Nimati-Chilapata in Buxa Tiger Reserve and Wildlife III Divisions

Buxa-Ripu via Sankosh in Bengal and Assam inter-state boundary

Although the Ministry of Railways had promised to take measures to reduce elephant deaths, accident rates have not significantly declined. Activists and wildlife officials of the central as well as state forest departments, hoping to reduce the horrific deaths, met Railway Ministry officials on a number of occasions to discuss ways to mitigate the problem. One suggestion was to ensure that trains passing through forest tracts should travel at low speeds of around 25 km/hr (reduced from 50 km/hr) between 4:00 pm to 5:00 am (when elephants are likely to be crossing tracks), to give loco drivers sufficient time to stop the train when elephants are spotted on the track, without fear of danger to human lives. The reaction time to stop a running train along a sharp curve is very short – sometimes a few seconds, and the situation becomes more critical in winter, when mist reduces visibility. Most accident-prone sections of railway tracks are those with sharp curves and where the forest density is high and close to the tracks.

Wildlife accident prone zones of the 'killer tract' of Dooars in West Bengal

Accident prone railway sections	Stretch (in km)
Gulma to Sevoke	7.9
Sevoke to Bagrakote Railway Station	4.2
Damdim Railway Station to New Mal Junction	1.3
Chapramari Rail Gate to Jaldhaka river	3.0
Chengmari Railway Station to Banarhat Junction	0.6
Banarhat Junction to Binnaguri Railway Station	1.5
Binnaguri Railway Station to Dalgaon Railway Station	0.5
Madarihat to Hashimara	2.4
Dima Railway Gate to Damanpur, Buxa Tiger Reserve	6.0

The Ministry initially did not agree to the recommendation to reduce train speed in tracts abutting forest, or to the other recommendations of wildlife activists/officials, saying that this would adversely affect their services. However, they had to give in after a ruling of the Supreme Court of India. The other recommendations, such as erecting fences along the

Despite featuring in the logo of Indian Railways, the Asian Elephant remains a victim of train-hit accidents

PRABAL BERA

India is home to between 50–60 per cent of all of Asia's wild elephants and about 20 per cent of domesticated elephants

tracks to discourage elephants from crossing them and construction of elevated tracks over a stretch of 168 km did not find favour on the grounds of the tremendous cost and practical difficulties involved in implementation. With the ruling, control of train speed and the need for constant whistling along elephant crossing areas have been listed in the General Rule Book of the Railways. The 2014 Railway Budget has provided some good news by allocating Rs. 300 crores for doubling of broad gauge lines from New Jalpaiguri to New Cooch Behar via Samuktala Road route that would help divert trains that go through the forest areas in the north. Recently, the Supreme Court has instructed the Railway Ministry to initiate diverse campaigns to inform passengers not to throw food and related items on the tracks, as elephants get attracted to the discarded food and wander on to the track.

The Forest Department now collaborates with the North Frontier Railways in saving wildlife, and also ensuring safe rail travel for passengers by preventing collision with elephants. In the Dooars, Forest Department personnel routinely patrol the tracks. When animal movements are detected, they alert the Railway Department. However, sometimes animal movements happen unpredictably and the railway control room personnel may not get the information from the Forest Department, so train hits still occur. Let us hope that with these and more mitigation measures, elephant mortality from collision with trains becomes a thing of the past in the Dooars and in other parts of India. ■

Dipanjan Ghosh, a teacher by profession, is a well-known popular-science writer and one of the Editors of *Indian Science Cruiser* published from Kolkata.

Sreeparna Ghosh is a conservation activist and is associated with Ecocampers, a Bardhaman-based NGO which engages in nature conservation.

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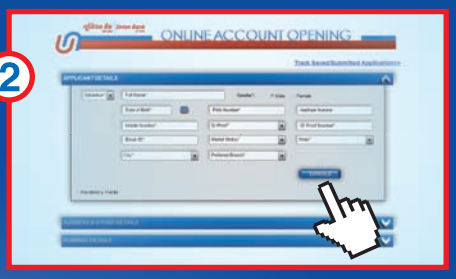

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Challenged Coasts

Text: **Deepak Apte**

The coast is the interface between the sea and the land, a space that is constantly changing in time and space. Coastal areas harbour a variety of ecosystems such as mangroves, coral reefs, seagrass beds, mudflats, and sandy shores where a variety of floral and faunal species abound. It is intact coastal ecosystems – dense mangrove forests, wide sandy shores, healthy coral reefs – that provide the buffer between the elements of nature and human beings.

Coastal areas play an important role in the socio-economic development of a country primarily because seaborne trade remains the cheapest method of transporting large quantities of goods over long distances. Globalization demands movement of large quantities of raw materials and finished goods, and consequently there is strong emphasis on the development of ports and harbours. Concomitantly, areas around ports come under development pressure from industries, settlements, and tourism. The natural ecosystems in coastal areas therefore come under stress resulting in a breakdown or deterioration of ecosystem services, as well as loss in biodiversity.

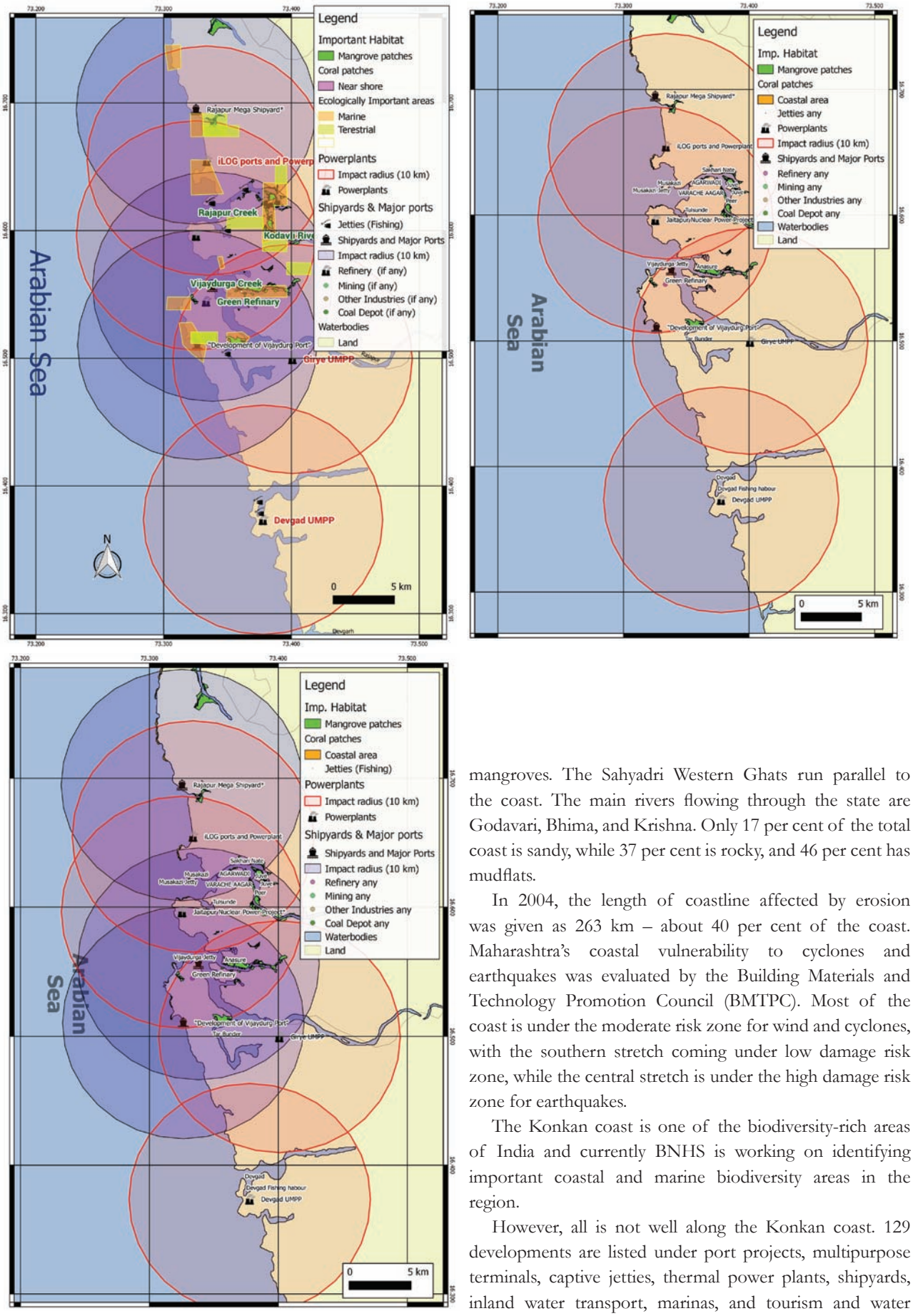
Destruction of habitats has been reported as one of the major cause for the loss of biodiversity, according to the Convention on Biological Diversity. India's mainland has a coastline of more than 6,000 km, a fraction of the world's coastline, but 17 per cent of the world's population, according to the 2011 census, lives in India. Of this, over a quarter live within 50 km of the coastline. On the Indian mainland, there are nine maritime states and two union territories with a coastline. There are 73 coastal districts (of a total of 593); 77 cities and towns are located on the coast, including the urban agglomerations of Mumbai, Chennai, Kolkata, and rapidly expanding cities like Kochi and Visakhapatnam.

The Indian coast is under tremendous pressure from population and 'development'. However, there are no assessments available at the national level to provide estimates of the extent to which the coast is actually occupied by various human activities, and their possible impacts on the coastal biodiversity.

Some major issues that are threatening the coastal ecology of India in general and Maharashtra in particular are coastal structures, thermal power plants, ports, shipyards, and sea walls.

Case study: Coastal Issues of Maharashtra

Maharashtra is the third largest state in the country both in terms of size and population. Maharashtra is one of the most industrialized and urbanized states of India. About 42 per cent of the state's population is living in urban areas, though the levels of urbanization are uneven across regions and districts within the state. The state has a 652.6 km long indented coastline, characterized by pocket beaches flanked by rocky cliffs of Deccan basalt, estuaries, and patches of



mangroves. The Sahyadri Western Ghats run parallel to the coast. The main rivers flowing through the state are Godavari, Bhima, and Krishna. Only 17 per cent of the total coast is sandy, while 37 per cent is rocky, and 46 per cent has mudflats.

In 2004, the length of coastline affected by erosion was given as 263 km – about 40 per cent of the coast. Maharashtra's coastal vulnerability to cyclones and earthquakes was evaluated by the Building Materials and Technology Promotion Council (BMTPC). Most of the coast is under the moderate risk zone for wind and cyclones, with the southern stretch coming under low damage risk zone, while the central stretch is under the high damage risk zone for earthquakes.

The Konkan coast is one of the biodiversity-rich areas of India and currently BNHS is working on identifying important coastal and marine biodiversity areas in the region.

However, all is not well along the Konkan coast. 129 developments are listed under port projects, multipurpose terminals, captive jetties, thermal power plants, shipyards, inland water transport, marinas, and tourism and water

List of proposed Power plants (Thermal/Nuclear), Refinery, Shipyards and Major Ports along the coast of Maharashtra, India

No.	Name	Village	District	By	Type	Capacity_PP	Capacity_port	Status
1	Trombay Power Station Unit 6 conversion	Mahul	Mumbai	Tata Power	PP-C	500		Permitted
2	Thakurli Powerplant by central-railways	Thakurli	Mumbai	Central Railway	PP-G	700		Revival of Old powerplant (Decommisioned in 1980)
3	Urban Energy Generation Pvt Ltd	Dronagiri, Navi Mumbai	Navi mumbai	Urban Energy Generation Pvt Ltd	PP-G	2100		0
4	Dahanu power station	Dahanu	Palghar	Reliance Infrastructure Limited	PP-C	500		Working
5	ONGC gas power plant - tokrale	Kelva - Mahim	Palghar	ONGC	PP-G	2200		Proposed
6	Bhagad powerplant 1300 MW	Bhagad	Raigad	DMICDC	PP-G	1300		0
7	Pioneer Gas Power's 388 MW Phase I & II	Bhagad, Raigad	Raigad	Pioneer Gas Power Ltd	PP-G	888		0
8	Dolvi captive power station	Dolvi	Raigad	JSW Steel	PP-C	660		Announced
9	Urban Energy Generation Pvt Ltd	Kondgaon, Roha	Raigad	Urban Energy Generation Pvt Ltd	PP-G	2100		0
10	Rewas Port	Rewas	Raigad	Relience Ind?	Port		127	Proposed (exploration phase)
11	iLOG ports and Powerplant	Ambolgad	Ratnagiri	iLOG	Port and Powerplant	450	4.5	Proposed (1ST Public hearing)
12	Bhopan PP	Bhopan, Dapoli	Ratnagiri	GMR	PP-C	1800		0
13	Dhopave PP	Dhopave	Ratnagiri	NTPC	PP-C	1600		0
14	Ratnagiri Power Plant Unit 1 –4	Jaigad	Ratnagiri	JSW Energy	PP-C	1200		Operating
15	JNPP	Jaitapur	Ratnagiri	NPCIL	UMPP	9900		Construction phase
16	HPCL Tavsal	Tavsal	Ratnagiri	HPCL	Refinary		9	Proposed (exploration phase)
17	Dhakore-Ajgaon Power project	Dhakore	Sindhudurg	Ind bharat power	PP-C	1050		Proposed (exploration phase)
18	Girye UMPP	Girye	Sindhudurg	Not bidded - Coastal Maharashtra Power Ltd.	UMPP	4000		Proposed (exploration phase)
19	Devgad UMPP	Munge	Sindhudurg	Devgad UMPP	UMPP	4000		Proposed (exploration phase)
20	Vijaydurg port	Vijaydurg	Sindhudurg	M/s Vijaydurg Port Private Limited (VPPL)	Port		75	Proposed (exploration phase)
21	Nandgaon port	Nandgaon	Thane	JSW	Port		16.7	Proposed (exploration phase)
22	JAIGAD PORT (DHAMANKHOL BAY)	DHAMANKHOL, Jaigad	Ratnagiri	JSW	Port		18	Proposed (exploration phase)
23	Angre Port	Lavgan, Jaigad	Ratnagiri	M/s Chowgule Ports & Infrastructure Pvt. Ltd.	Port		16	In operation since April 2012
24	Redi Port	Redi	Sindhudurg	Redi Port (Developer: Redi Ports Ltd.) Earnest Group	Port		33	Proposed (exploration phase)
25	Karanja (Dharamtar)	Karanja	Raigad	PNP Maritime Services Ltd.	Multipurpose terminals			In operation since 1998
26	Jaigad (Lavgan)	Lavgan, Jaigad	Ratnagiri	Lavgan Dockyard Ltd.	Multipurpose terminals			In operation since 2005
27	Jaigad	Jaigad	Ratnagiri	Marine Syndicate Ltd.	Multipurpose terminals			In operation since 2009
28	Panvel (Ulwa–Belapur)	Panvel	Raigad	Ambuja Cements Ltd.	Captive terminals			In operation since 1994
29	Alibag (Dharamtar)	Alibag	Raigad	Ispat Industries Ltd.	Captive terminals			In operation since 1994.
30	Revdanda	Revdanda	Raigad	Vikram Ispat Ltd.	Captive terminals			In operation since 1993
31	Ratnagiri (Pawas– Ranpar)	Pawas	Ratnagiri	Finolex Industries Ltd.	Captive terminals			In operation since 1993
32	Dabhol	Dabhol	Ratnagiri	Ratnagiri Gas and Power Pvt. Ltd.	Captive terminals			Agreement likely to be signed
33	Dharamtar – Dherand	Dharamtar	Raigad	Supreme Petrochem Ltd.	Captive terminals			Thirty years Concession Agreement signed 2004
34	Usgaon, Dabhol	Usgaon	Ratnagiri	M/s. Bharati Shipyard Ltd.	Shipyard			Operational
35	Bhagwati Bunder, Ratnagiri	Bhagwati	Ratnagiri	M/s. Bharati Shipyard Ltd.	Shipyard			Operational
36	Dighi	Dighi	Raigad	M/s Dighi Port Ltd. (Balaji Group)	Port		18.5	Work in progress
						34948 MW	17.7 MpTA	

PP-G: Powerplant Gas; PP-C: Powerplant Coal; UMPP: Ultra mega powerplant;

RECOMMENDATIONS

Based on the above observations the following recommendations should be considered if India is serious about protecting its natural assets. The MoEFCC, with a view to making coastal governance transparent and accountable, should:

- **Policy**: Draft a coastal policy for conservation of biodiversity in the planning stage, not at individual project level, to safeguard the rich natural resources of the country.
- **Planning**: Have integrated approach taking into account the environmental and social concerns. Have national and regional planning based on comprehensive information, carrying capacity, cumulative impact and precautionary principles, and commitments made by India to itself and to the international community.
- **Capacity building**: Strengthen environmental governance with adequate human and financial resources for monitoring and enforcement, in keeping with the number of projects sanctioned.
- **Civil society participation**:
  a) Engage locals in decision making process at inception stage of project to make development inclusive and harmonious.
  b) Include independent specialists known for their integrity from civil society, and representation from fishing communities at all levels.
- **Assessment of damage**: Conduct at the earliest a detailed assessment of existing projects, which takes into account environmental, social, and economic impact, cumulative impact, and habitat loss, mitigation cost and current efficiency, with possibilities for upgradation.
- **EIA**:
  a) Review the EIA process for coastal projects to improve the Terms of Reference for marine and coastal EIAs.
  b) Make EIAs independent of project proponent and to be commissioned by MoEFCC.

sports facilities along the Konkan coast. Two of the major ports of the country are located in this state: Mumbai Port (MbPT) which is a natural deepwater harbour, and Jawaharlal Nehru Port Trust (JNPT), which is the largest container port in India. In addition, there are 48 minor ports which fall into five groups, namely Bandra Group (9 ports), Mora group (11 ports), Rajpuri group (9 ports), Ratnagiri group (11 ports), and Vengurla group (8 ports). At present only eight minor ports are in operation.

In order to provide multi-user port facilities, the Maharashtra government has decided to develop six minor ports: Rewas-Aware and Dighi in Raigad district, Jaigad (Dhamankhol Bay and Lavgan) in Ratnagiri district, and Vijaydurg and Redi in Sindhudurg district. Of these, the development of Rewas-Aware and Dighi ports is already in progress through private sector participation. There are three multipurpose terminals in operation: Karanja (Dharamtar), Jaigad (Lavgan), and Jaigad (Katale). Four captive terminals are in operation at Panvel (Ulwa-Belapur), Alibaug (Dharmantar), Revdanda, and Ratnagiri (Pawas-Ranpar). There are two projects in progress, and five for which permission has been given by the Maharashtra Maritime Board. Two shipyards at Usgaon in Dabhol, and Bhagwati Bunder in Ratnagiri, are in operation. Ten more have been given permission. Five sites have been shortlisted around Mumbai for Marinas: Mandwa, Belapur, Vasai Creek, Malad Creek, and Dharmantar Creek.

Maharashtra already has the maximum number of thermal power plants (Table 1) **in the country??**. With heavy industrial demand, a large number of companies are planning to set up coal- and gas-based projects to generate 35,000MW.The coastal districts of Ratnagiri, Sindhudurg, and Raigad are likely to become the power hub of the state.

Challenges and Issues in the Coastal Zone: Some of the major problems faced by the littoral zone and the shore front areas of Maharashtra coast are related to coastal erosion, siltation, pollution, destruction of mangrove swamps, coral reefs and inter-tidal areas, salt marshes, slope failure, pressure of population, industrialization, and road transport.

The Konkan coast is under grave threat of over development, with at least 15 proposed coal-fired power projects equaling 25 GW and one nuclear power plant of 10,000 MW set to be built on a narrow strip of coastal land 50 to 90 km wide and 200 km long. This represents a 200% increase in coal-fired power for the entire state of Maharashtra, a state which already has the largest total installed capacity, equal to 11 GW or 13% of nationwide capacity. Such development will also promote the development of ancillaries, apart from human settlements due to in-migration. This would completely transform the coast and result in a tremendous loss of biodiversity. In addition, there are aquaculture farms, mining, and tourism activities. All these are likely to have a cumulative impact on the biodiversity. While the 2000 report by Untawale and his coworkers gives us some idea of the biodiversity of the region, and data from WII which identified at least 10 ICMBA (Important Coastal and Marine Biodiversity Areas), BNHS is currently preparing a systematic report on the important ecologically and biologically significant coastal and marine areas and the biodiversity therein.

Deepak Apte is presently the Director of the BNHS. A scientist of international repute, his specialisation is in marine ecology.

Nature education activities for schools

CEC Mumbai conducted a range of nature education activities at the Centre as well as in schools during the quarter. The most noteworthy was the ongoing Environmental Awareness Programme for special children supported by Tata Motors for municipal schools and aided state board schools. During the quarter, the Centre reached out to nearly 2,700 students with interesting teachings on biodiversity and sustainability, along with conducting nature trails.

As a part of the Basic Course in Ornithology, field trips were conducted to birding destinations around Mumbai, namely Karnala, Bhandup, and Tungareshwar, apart from a three-day camp to Bharatpur in Rajasthan from November 27–29. Visitors to CEC included colleges like Sophia, Shailendra, and Patkar, the L&T Institute of Technology, and schools like Billabong High, Pawar Public School, and Ecole Française Internationale. CEC hosted the BNHS-IBA Common Bird Monitoring Workshop on November 21, attended by 20 birdwatchers. The workshop, which demonstrated field techniques for participants, aimed at involving locals in scientific monitoring of common birds.

Corporate events included an onsite programme for the children of Reliance Infrastructure employees in Mumbai, with nature trails and audio-visuals in CEC for employees of Next Services and clients of Tour Escape. "Walk in the Woods" was organized for 50 college students in association with Times Group as part of the Maharashtra Times Carnival on December 12, to sensitize the youth about our natural wealth and the importance of sustainable lifestyles.

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Participants of the Environmental Awareness Programme addressed by Atul Sathe, PRO & Asst. Director CEC

Other initiatives included a clean-up up to Sálim Ali Point, creation of a soil patch near the waterhole for monitoring pug marks, and a demonstration unit for organic vegetable gardening to impart information about organic farming to visitors. ■

Nature education @ CEC-Delhi

Continuing with its mission of imparting nature education to citizens of the national capital, CEC-Delhi conducted 20 activities during the quarter in which more than 1,200 people participated, including school children, college students, government officials, and family groups. The activities included nature walks, bird walks, jungle drives, and workshops, including special events like 'Into the Wild' (winter exploration and barbeque) and 'Leopard Trail'.

Under the Leopard Trail programme, participants were taken to the forest in vehicles to explore the presence of leopard in Asola Bhatti Wildlife Sanctuary. Nature walks were conducted in Okhla Bird Sanctuary, particularly for school and college students.

Other notable events included a special birding programme for less privileged college students, nature walks for a doctors' club and for officials of Government of Delhi and their families. Three workshops were conducted on native plant nursery, kitchen gardening, and bird nesting/feeding, for zoology students of Zakir Husain Delhi College. CEC-Delhi made poster presentations at an exhibition organized by Amity University, Delhi, to create awareness about environment and wildlife conservation. ■

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College students enthusiastically involved in the special birding programme

Secretary, Revenue & Forests Department, Maharashtra visits Hornbill House

Shri Vikas Kharge, Secretary, Revenue & Forests Department (Forests), Maharashtra, and Shri N. Vasudevan, Chief Conservator of Forests, Mangrove Cell, Mumbai, visited BNHS on January 7, 2016. Both the officials were impressed with the efforts of BNHS scientists in maintaining the invaluable specimen collection and books in the library, where they spent considerable time to understand the different processes involved in maintenance, and to observe the unique specimens and rare books. They were especially fascinated by the John Gould lithographs present in the library and took keen interest in understanding the process of restoration of old books. Dr. Deepak Apte, Director, BNHS, discussed various ongoing research and conservation activities with the guests, who appreciated the efforts of BNHS in studying, documenting, and protecting the flora and fauna of India. ■

Bird Marathon & Pakshimitra Sammelan

BNHS-IBA team comprising Dr. Raju Kasambe (Programme Manager) and Mr. Siddhesh Surve (Project Coordinator) participated in the 6th Kaiga Bird Marathon in Karnataka on January 10, 2016. This event was organized by Nuclear Power Corporation of India (NPCIL) with the aim of identifying bird species around the Kaiga power plant. A total of 264 bird species were recorded during the event, of which 19 species were recorded for the first time in the area.

Another major event for the IBA team was the 29th Maharashtra Pakshimitra Sammelan held at Sawantwadi, Maharashtra on January 23–24. A list of standardized Marathi names compiled by Dr. Kasambe, for 577 bird species was released during the event. This effort is aimed at enhancing the dissemination of ornithology among the masses. Mr. Nandkishore Dudhe (Research Assistant, IBA) delivered a talk on the Common Bird Monitoring Programme – a citizen science initiative for scientific monitoring of bird populations in India. ■

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Activities @ Central Marketing Department

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BNHS exhibited a wide range of ecofriendly products during the Pakshimitra Sammelan (L) and Mumbai Kalaghoda Festival (R) 2016

Awards for BNHS Experts

The Kirloskar and Vasundhara Club has been organizing the Kirloskar Vasundhara International Film Festival (KVIFF), India's only festival dedicated to the environment, wildlife, energy, air, and water since 2007. Every year, environment experts, students, activists, filmmakers, photographers, and enthusiasts from across the globe participate in this festival. KVIFF honours distinguished personalities in the field of environment under various categories. This year three BNHS experts – Mr. Isaac Kehimkar (Deputy Director Natural History), Mr. Sanjay Karkare (Assistant Director SLTP, Nagpur) and Dr. Pramod Patil (GIB Advocacy Officer) were felicitated by KVIFF at ceremonies held in Pune and Nagpur, for exceptional work in the field of environment conservation and education.

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Mr. Sanjay Karkare was felicitated with Vasundhara Sanman during KVIFF, in Nagpur on December 2015, for his exemplary contribution on the central Indian landscape through the BNHS Satpuda Landscape Tiger Programme for the last 10 years

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Dr. Pramod Patil was awarded Vasundhara Satkar in KVIFF on January 07, 2016, for his valuable efforts towards saving the Great Indian Bustard

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Mr. Isaac Kehimkar was presented with two awards: Kirloskar Vasundhara Green Teacher Honor on January 13, 2016, in Pune for his exemplary role in imparting knowledge to the younger generation of naturalists and conservationists; Sanctuary Green Teacher Award 2014, on December 05, 2014, for his outstanding contribution to conservation and learning; the award being a recognition to his deep passion and incredible knowledge on natural history

Published on March 23, 2016, by Dr. A.M. Bhagwat for Bombay Natural History Society, Hornbill House, Dr. Sálim Ali Chowk, Shaheed Bhagat Singh Road, Mumbai 400 001, Maharashtra, India.

Ladakh - Roof of the world

Date: August 10–21, 2016

The Great Migration – Kenya

Date: August 14–22, 2016

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