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CONTENTS

FEATURES



Reunion in a Sugarcane Field

Ajay Deshmukh with Mandar Sawant
and Sanchit More

There are simple solutions to a problem
and there are difficult, but not impossible,
ones too. The Wildlife SOS team chose
the second option and has succeeded
in reuniting more than 40 cubs with their
mothers. Read more ...

A Tryst with the Ghost of the Sundarbans

Soumyajit Nandy

It is not usual to sight a tiger in the
Sundarbans, but when that is the reason
for visiting, one has many stories to tell.
The author shares one such encounter
with the 'Ghost of the Sundarbans'.



Birding at Bhigwan

Shashank Birla

With more than 200 species of birds,
Bhigwan is the ideal location for field
training of budding bird enthusiasts. The
author shares his experiences from this
trip.

PHOTOFEATURE

A Chronicle from Kaziranga

Rahul Khot

Have you ever had to pay for another's
misdeed? Here is a story where a
Changeable Hawk-Eagle lost its meal
because of a Steppe Eagle.



Others

Book Reviews	22
Readers' Space	29
Obituary	30
Nature Watch	32
Conservation Notes	42
News Briefs	47

Conserving Migratory Waterbirds

The Central Asian Flyway (CAF), the shortest among the nine global waterbird flyways, is crucial for migratory birds that winter in the Indian subcontinent. The Central Asian Flyway covers a large continental area of Eurasia bounded by the Arctic and Indian oceans. The April-June 2017 issue of *Hornbill* featured the CAF in detail, and discussed the CAF Action Plan for the conservation of waterbirds and their habitats, and various other agreements under the Convention on the Conservation of Migratory Species of Wild Animals (CMS). Among all the plans, the CAF Action Plan sets the agenda for enhanced regional environmental cooperation among the 30 CAF countries (officially called Range States) to promote the conservation of migratory waterbirds and their habitats. Within the CAF countries, India stands to gain the most from strengthened international cooperation frameworks and effective measures to protect its birds and habitats.

BNHS has been participating in various CAF and CMS meetings, workshops, and scientific committee meetings and has been actively involved in the framing of science-based action plans for the conservation of migratory birds and their habitats. Many of the BNHS's flagship programmes are extremely helpful in addressing flyway-level conservation issues. These include our nine-decade bird migration studies, two-decade vulture conservation programme, and two-decade Important Bird Areas (IBA) programme. BNHS has managed to persuade the Indian Government to lead an initiative to reawaken the CAF Action Plan, which has lain dormant and unimplemented since its adoption in 2005. BNHS extends technical support to the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, for successful implementation of the actions envisaged in the Plan.

At present, and looking ahead, the country urgently needs to take a strong international lead and work with other governments and key stakeholders to forge ahead, using the existing building blocks to rapidly promote implementation of prioritized actions and develop other initiatives. Besides providing technical support, BNHS acts as a bridge between the government and CMS and CAF related instruments. Government of India and BNHS jointly organized a side event in the CMS Conference of Parties (CMS COP 12), which was held in Manila, the Philippines, during October 2017, with active support from BirdLife International and Wetlands International.

BNHS brought out a notable publication, *INDIAN BIRD MIGRATION ATLAS*, during the side event. Besides its contribution to Indian Ornithology, the Atlas provides information on the origins, migration routes, as well as stopover and wintering sites of waterbirds migrating into the Subcontinent. The availability of such information would be essential data at global forums during discussions on measures for protecting migratory birds and their habitats in the CAF.

For honouring India's commitment to the Conservation of Migratory Species (CMS) and implementing the CAF Action Plan to Conserve Migratory Waterbirds and their Habitats, 29 sites including 20 major wetlands and 9 wetland clusters were identified as critical, crucial, and bottleneck sites for migratory waterbirds. BNHS now plays a central role in conducting a series of strategy meetings, to work out plans for executing long-term monitoring and conservation of the ornithologically important critical and bottleneck sites. This is part of implementing the CAF Action Plan in consultation with various state governments,



government organizations and institutions, and NGOs. So far two such meetings have been conducted between August and October, 2017, where BNHS discussed and established the criteria for selection of ornithologically important wetlands for conservation and management, along with other stakeholders.

During CMS COP 12, the Indian Government expressed its willingness to develop, in consultation with the CMS and African Eurasian Waterbirds Agreement (AEWA) secretariats and CAF range states, a mid-term plan for further development and operation of the CAF Action Plan for Waterbirds. The parties appreciated India's role and requested India to submit a proposal to the 7th AEWA Meeting of the Parties to incorporate the CAF Action Plan into AEWA. Time-lines have been prepared to achieve these objectives, with BNHS being instrumental in this endeavour. Government of India will now hold the next CMS COP 13 in 2020 to showcase India's commitments and initiatives for implementing the CAF Action Plan.

MoEF&CC has established three national level committees comprising of representatives from government, government institution and NGOs to follow up and ensure successful implementation of the CAF Action Plan. The first committee to assess the implementation of the CAF Action Plan on a periodic basis will also guide the state/union territory forest departments for its effective implementation. The second committee will study the CAF Action Plan and prepare a National Flyway Action Plan. The third committee will develop a framework for management effectiveness evaluation of wetlands in connection with implementation of the CAF Action Plan. It will assess and prioritize the wetlands in the country for undertaking management effectiveness evaluation. This Committee will also prepare a format for undertaking management effectiveness evaluation of wetlands outside protected areas. BNHS has been included in all the committees as a member to support the MoEF&CC in technical issues.

As part of the implementation of CAF Action Plan, the Range States would call upon other partners and stakeholders, including the private sector, through formal designations and voluntary measures as needed, to afford high priority to the conservation of sites and habitats identified as important to migratory birds. To help the MoEF&CC to achieve this, BNHS started a dialogue with its BirdLife partners, NGOs, and some governments in the CAF range states to develop common strategies, and to support the mid-term plan for further development and operations of the Central Asian Flyway Action Plan for Waterbirds. In this regard, BNHS scientists held dialogues with BirdLife partners in South Asia region, Uzbekistan, Kazakhstan, and Turkmenistan, and also with the Sri Lankan government.

BNHS has prepared the internal document for addressing various CMS components like CAF Action Plan, African-Eurasian Migratory Landbirds Action Plan (AEMLAP), Raptor MoU, and Single Species Action Plan for species of conservation concern, globally and regionally. In all, 20 species have been identified by BNHS for the Single Species Action Plan. We believe that in these processes, BNHS will find the best way forward along with the MoEF&CC, State Governments, regional and global partners, and other interested range states, for implementing the CAF Action Plan.

Deepak Apte
P. Sathiyaselvam

Reunion in a Sugarcane Field

Text: **Ajay Deshmukh** with
Mandar Sawant and
Sanchit More

“**S**top! Sir, please!” cried one of the villagers. “We won’t let you release these leopard cubs here. Keep them trapped in the cages as bait for their mother, and as soon as she enters the cage, please shift them to some other location.”

Such scenarios have become an integral part of our work. People want us to rescue leopard cubs from their sugarcane fields, but when it is time for their release, they oppose it. On that day, we were in the same situation. I remember vividly, it was a bright sunny Sunday morning, May 3, 2015. We had planned a sumptuous non-vegetarian meal. The same morning, we received a call from Manisha Kale, Forester of Narayangaon area. We could easily guess that the call was regarding

leopards, since we know that there are many of them in the vicinity. And sure enough, she informed us about the sighting of leopard cubs at Dhere Mala and asked us to rush to the site, to which we responded immediately. Whenever we get information regarding leopard cubs, we treat it very sensitively, since they are the future generations of this species.

We had nearly reached the site, but there was a huge crowd of two-wheelers, four-wheelers, and bicycles on the route. Stuck in the traffic, I



thought “What must the cubs be going through right now, lost in the fields, away from their mother?” Leopard cubs are naïve about human behaviour and today they were lost in a sea of panicky, excited, and curious humans. Some were trying to make them roar by pushing and hitting the traumatized cubs, and a few were even trying to get selfies. Somehow we made our way to the site and were shocked to see the most dreadful sight of four terrified cubs, with burns and scars, mewling with pain.

The cubs needed treatment immediately, so we quickly carried them towards the rescue van. How did these cubs get burnt? In the rescue van, Manisha Kale told us that a farmer named Baburao Tambe was harvesting sugarcane in his field. He had set his field on fire to burn dry leaves, hoping to drive away or kill lurking snakes, a practice commonly followed when hand harvesting. The mother leopard and cubs got trapped in the fire, and to protect her cubs she tried to attack a worker, Bhausaheb Kedare. The fire spread quickly and Kedare was saved from the leopard, but she got scared and abandoned her cubs in the field.

Being a veterinary doctor, I treated the cubs. As their burns were not deep, I decided to release them as soon as possible at the same site. I was sure that the mother leopard would come back for her cubs. I shared my opinion with the founders of my organization Wildlife SOS, Kartick Satyanarayan and Geeta Seshamani, who agreed with me, and later obtained consent from the Deputy Conservator of Forests of Junnar, Mr. Vitthal Dhokate, and the Range Forest Officer, Mr. S.N. Bansode. Among the four cubs, there were two females and two males. One was quite healthy, and we named him Gotya.



The four traumatized cubs were mewling in pain



The cubs were carried to the rescue van for treatment

The whole team, which included Mahendra Dhere, Dhondu Kokane, Vaibhav Neharkar, and Shivaji Modhe, got ready for the release operation. We were accompanied by Manisha Kale and S.N. Bansode from the Forest Department office. Our organization's photographers also joined us. We left for the release site in three vans at around 6:30 p.m. I took charge of the cubs and carried them in a vegetable crate, which I held firmly on my lap. Gotya, the healthiest, was very mischievous, trying to climb out of the crate. I picked him up in my arms to prevent him being hurt again, just like I hold my five-month old son!

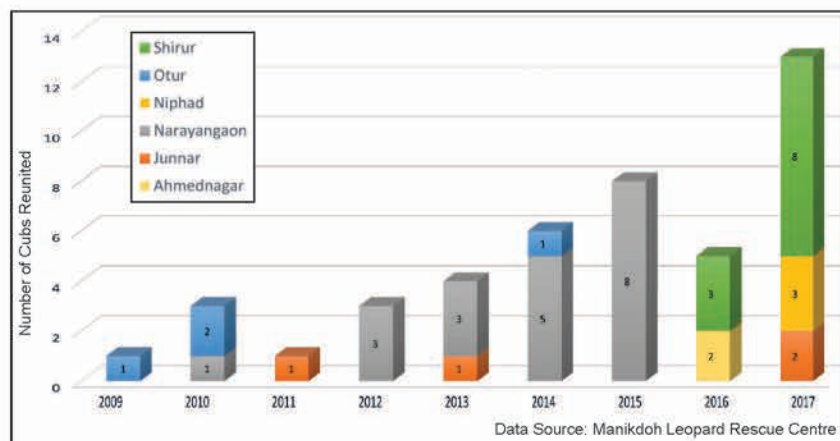
for the villagers. We foresee this and so we won't allow you to release them here." He continued, "It's our request, Sir, we have been writing about this to the forest officials and other authorities but our plea has gone unheard. Please don't miss this opportunity, now that you have the cubs, lure the mother leopard into the trap and shift all of them to some other place." That was the crunch. I felt dejected after listening to this, and had no words to express my feelings, to make them understand the value of these cubs. I was in a dilemma, seeing both sides of the coin, knowing that the villagers' concern was completely valid.

mother. Once reunited, for want of safety the mother transfers the cubs to another location."

Our efforts were fruitful; people were now calm and with a positive approach. We could still feel a bit of hesitation on their part, which was taken care of by Kokane Mama. He said, "If we don't release the cubs here right now, they will be taken away to a leopard rehabilitation centre in Manikdoh and they will have to spend the rest of their life in captivity." Kokane Mama had nailed it! A few of the villagers were convinced. An old villager came forward and asked the others, "The mother leopard lived with us in these fields for so many years but did she ever harm us before?" This question forced people to think, and many of them nodded in agreement. The old man was supported by Krishna Dhere, a young man around 20–25 years of age. He stepped forward and said, "Sir, you set the cubs free here and let them meet their mother." Krishna later joined our team and was part of many such rescue operations.

We gathered at the spot where the cubs were to be released. A camera trap was fixed there to get images of the mother leopard when she come looking for her cubs. We kept the cubs in the vegetable crates and moved to a spot from where we would be able to see the leopard's movement. It was 10:00 at night and we were extremely hungry, so we had some snacks, and then we waited for the mother to arrive.

All of a sudden, we heard birds chirping and saw them flying to and fro in the vicinity. Suddenly the camera flashed. The prime function of a camera trap is to sense every movement in front of it and flash simultaneously. This meant that it had sensed some movement. We were all



A total of 44 leopard cubs have been reunited by MLRC till November 2017

Little did we know what was in store for us! On reaching the site and even before we could figure out a safe spot to release the cubs, we were surrounded by aggressive, shouting and yelling villagers asking us to stop the release. One of the farmers elaborated on their concern, saying "We feel scared for our kids, Sir, they accompany us to the fields and play here. If even by mistake they cross paths with the mother leopard and cubs, it might prove fatal for them and for us too. If released here, these cubs will grow into adults who will be even more dangerous

In the midst of this stalemate, Manisha Kale took charge and began to justify the need to release these cubs at the same site. She explained "When the mother leopard returns for her cubs and fails to find them, she will become aggressive and create havoc in the village." Hearing this, the chaos subsided a bit and people became thoughtful. I saw that the situation was now turning in our favour and began to speak to assuage their fears, followed by the other team members and also Mr. Mahendra. "We have handled similar situations in the past and successfully reunited cubs with their

overwhelmed, congratulating each other and celebrating the success of our operation.

Our team was keen to go to the site, but I told them to wait as it would take time for the mother leopard to carry away four cubs. It was around 2:00 a.m., and having waited for more than four hours, we decided to check on the cubs again. On reaching the spot, we were overwhelmed to see the crate empty. Nobody had slept the whole night, but the fact that the cubs were taken away by the mother leopard was such a relief that we forgot all the hardship we had gone through since the previous morning. So, finally, the mother and the cubs had reunited. All of us shed tears of happiness. We finally had a happy ending to our struggle, and to celebrate it what could be better than a hot cup of tea on a chilly night. The celebrations continued on our way to Narayangaon.

The scrub jungles of Maharashtra have always been ideal leopard habitat, the dry deciduous forest providing perfect cover for this stealthy cat to lurk in the wake of unsuspecting prey, mostly small mammals that abound in the region. In recent years, however, encouraged by financial incentives, the cultivation of sugarcane has increased in the region. Cultivated land and human settlements have slowly inched their way into the forests, destroying precious forest cover and substantially depleting the leopard prey base.

Junnar, a small taluka in Pune district, is no exception. Their habitat steadily overrun by settlements, and their source of food fast disappearing, the leopards of Junnar found themselves wandering into human habitation, lurking in the sugarcane plantations, becoming reliant on easier prey like dogs and livestock, and coming into contact



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The cubs were examined and treated for the burns before releasing them



SANCHIT MORE

Leopard breeding season and sugarcane harvesting coincide



WILDLIFE SOS

Cubs are placed in vegetable crates for the reunion

with people. The resultant conflict between these majestic denizens of the forest and their new neighbours is disturbing, although unsurprising.

In particular, instances of man-animal conflict in the region show a steep escalation in October-May, the cub season for the big cats. Female leopards wander into sugarcane fields, relying on the tall crop to shield their

offspring from predators. Before growing into sleek, powerful beasts, leopards are tiny cubs, helpless and vulnerable to predators. The cubs are highly dependent on their mother's nursing for up to three months and still remain reliant on her for nourishment, protection, and care. Cubs are born blind and feeble owing to the leopard's relatively short gestation

period. Mothers repeatedly relocate their infant cubs to avoid predators. In the cover of the sugarcane fields, the mother is lulled into a misplaced sense of security, confident that her offspring are out of danger.

In Maharashtra's Junnar region, agricultural landscapes with high human density are known to harbour leopards. The region is devoid of wild ungulates, but domestic animals include cattle, buffalo, goats, fowl, dogs, cats, as well as feral pigs. With rapid encroachment into forested areas bordering villages and fields, man-animal conflict in Maharashtra has increased dramatically in the last decade. In particular, problems related to leopards that enter fields and human habitations have risen, with felines wandering out of the shrinking forests as their territory and prey base deplete. To address these problems, specifically to house and care for leopards injured during man-animal conflicts, a leopard holding facility was established in Manikdoh, Maharashtra, in 2002. The centre was expanded in 2007 when the government partnered with Wildlife SOS to improve upon the existing facility.

Besides increasing space and further development of the centre, now called the Manikdoh Leopard Research Centre or MLRC, Wildlife SOS aims to mitigate the problem of human-animal conflict by spreading awareness among locals regarding the wildlife with which they share their environment, and by holding workshops for the Forest Department to train them to safely and efficiently deal with the issue.

Junnar Rescue Team (JRT)

Over the years, Maharashtra has been facing increasing incidents of leopard-human conflict. Wildlife SOS along with the Forest

Department reaches out to local communities through workshops, talks, sensitization, and awareness drives, educating people about leopards and their behaviour, leading to better understanding, tolerance, and reduction in the incidence of conflict, enabling an environment for threatened wildlife to flourish.

Most people have adapted to the presence of leopards in their landscape. Some say they walk after dark in groups, armed with torches, and usually talk aloud to avoid startling a large cat. They also claim that leopards do not confront people, but should it happen, they would give space for the feline to walk away. Many families confidently sleep out in the open, while livestock and poultry are secured in enclosures.

In order to reduce the response time in rescue and rehabilitation of animals trapped in conflicts, the Forest Department and Wildlife SOS have formed a team of 30 villagers from 10 villages in Junnar range – the Junnar Rescue Team (JRT). The JRT consists of handpicked, trained volunteers from villages prone to man-animal conflict. Villagers are likely to listen positively to their own people in times of crisis. They are the first to react, reach, and represent the Forest Department at the site. JRT does not only bridge the response time in rescue and rehabilitation, but generates employment for locals and helps increase the participation of common citizens in wildlife protection.

Forest departments across India are still not following this practice of reunion. Cubs are rescued and are



WILDLIFE SOS

Mother-cub reunion is the high point of this programme



WILDLIFE SOS

Sensitization and awareness drives are the means to reduce man-animal conflict

kept in captivity and usually most of them die due to improper care.

Leopards are highly adaptable species and have adapted to living in agricultural landscapes in Maharashtra. Reflecting on the action we took in returning the cubs to their mother, we realized that the 44 cubs that have been returned in this way will be able to live with their mothers in their own leopard societies. Had they been sent to zoos, they would

have lived as trapped animals in cages at huge government expense, while the mothers would have immediately reproduced more cubs at the capture site.

It is up to people to do their best to minimize conflict in human use landscapes. Coexistence is the need of the hour. The intention behind writing this article is to spread this concept among everyone so that this vulnerable cat can be saved. ■



Ajay Deshmukh is a Senior Veterinary Officer, Wildlife SOS at Manikdoh Leopard Rescue Centre. He treats rescued animals and rehabilitates them in the wild.



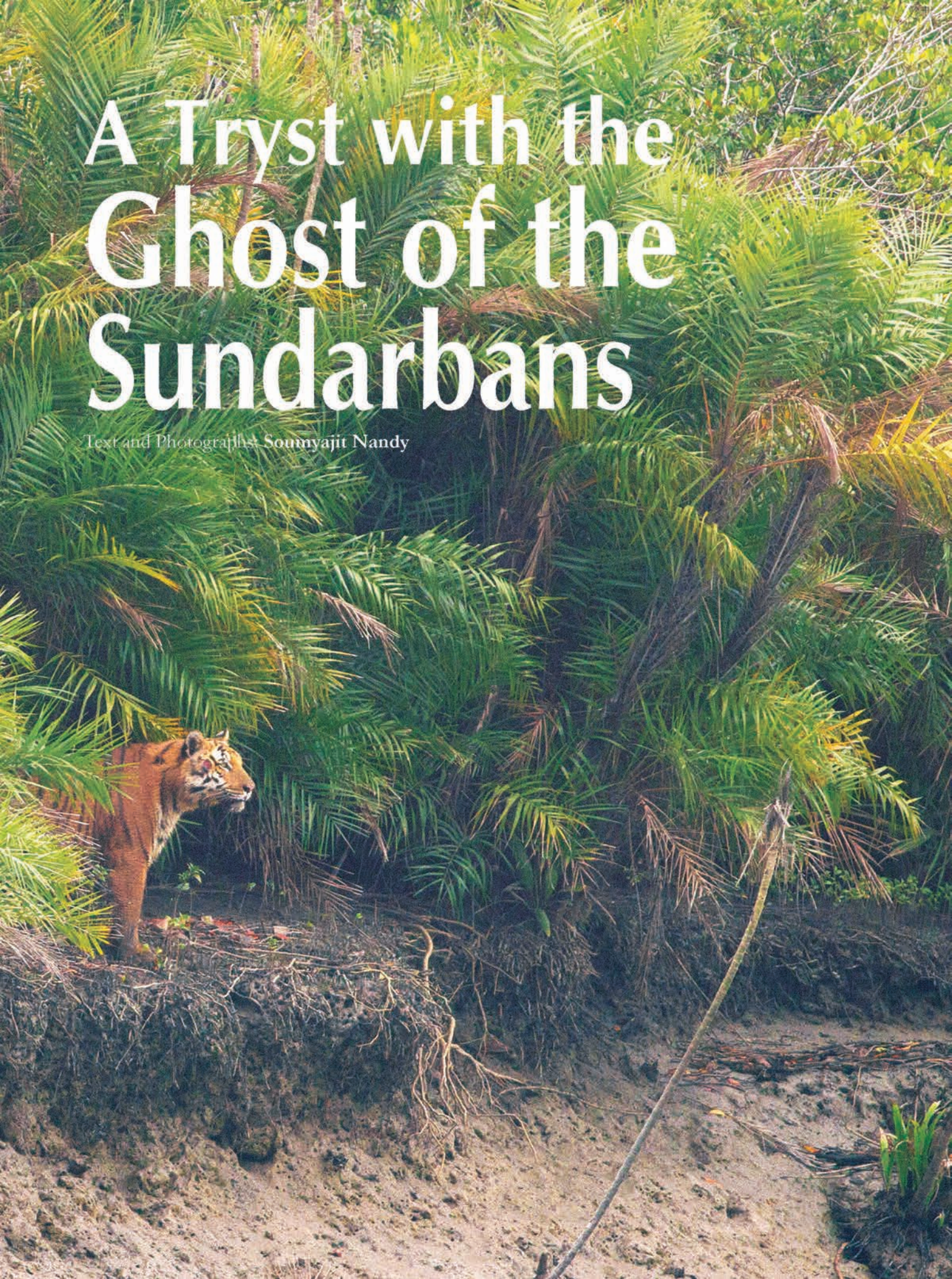
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A Tryst with the Ghost of the Sundarbans

Text and Photographer: Soumyajit Nandy



It is not an everyday affair in Sundarbans that one gets to see a tiger for five hours at a stretch. But when one has the blessings of Bonbibí – the guardian spirit of the Sundarban forests, along with excellent tracking skills and wholesome understanding of swamp tiger behaviour, miracles do happen.

It was December 22, 2015 at about 9:30 a.m., and we were about to come out of Sundorkhali and join Borogaji, when we saw a boat in front of us scanning the shoreline of Pirkhali-3 Island. Instead of following the same path, I asked my *sareng* (boatman) to go towards Panchamukhani-3 Island. At 9:55 a.m., I suddenly saw a thin tree bending, and the moment I looked below the tree, I saw four muscular white legs moving. “Tiger!” I shouted hoarsely and asked everybody to be ready. The big cat was moving in the same direction as our boat. The slow pace of our boat matched that of the tiger, and within moments, he was out in the open, looking at us. After watching us for some time, he started moving towards the Choragaji canal. As we

guessed that he would cross the canal, our plan was to position the boat at a strategic spot to capture some decent images. As we waited at the mouth of the river, the tiger emerged out of the thickets, sat down to investigate the surroundings, snarled and waded into the canal. It took him just a minute to swim across the 50 foot wide water body. He then climbed onto Pirkhali-5 Island, shook the water off his coat and moved into the thickets.

It looked like the show was over, but we were familiar with the behaviour of these swamp tigers. They like to walk along the shoreline to patrol their territory. As anticipated, we caught him again at the next canal. After climbing up the bank, he started walking into the forest, still visible to us. All the cameras kept capturing dream images. Then we saw him again at the next canal. This and the one before were shallower, so neither did he wait to survey the surroundings before getting in, nor did he snarl before entering the water. After crossing this canal, we expected him to cross the next one too, but majestically striding through the grasses, he

▼ The tiger emerged from the thickets to investigate his territory





Tigers patrol their territory by walking along the shoreline ▲

▼ Sundarban tigers navigate waterways that intersect their territory



turned around and started moving in the opposite direction. It was peculiar behaviour and we could not judge what he was up to. We thought that he probably wanted to cross the large river, and to avoid hindering his movement, we moved our boat back to give him sufficient space to facilitate the crossing. However, that didn't happen and he moved back to his original path. Since our boat was too far away, we

(*Phoenix paludosa*) forest. After this point we lost him again, but after almost 30 minutes a fisherman in a boat shouted to us "Babu jachhen" (Sir is going), pointing towards the direction they saw him go. And lo, we got him again. He crossed a dry canal and we noticed him drinking saline water from a small canal, a rare behaviour. We could not photograph this properly, as only the rear half of the tiger was visible.



This apex predator has little to fear in its dense forest habitat

could not reach the third canal in time to capture the moment of his crossing.

We thought we had lost the tiger, as the forest was dense and he was not to be seen anywhere. We were in a dilemma, whether to move forward or to wait. But then one of us suddenly whispered "There he is!" and sure he was there, peeping out of the Hental

We then caught him crossing another dry canal where he jumped across the mudflat, stopping to stare at us occasionally. Our guests were delighted to capture these action-packed moments on film. Thereafter, he rubbed his cheek and spray marked a Passur tree (*Xylocarpus granatum*). This was another observation which I captured for the second time



Checking out his domain ▲

▼ Spray marking a tree





Done for the present, the tiger sat relaxing among the mangroves

within a span of three months. He then selected an open spot near the bank and sat there for a while, surveying the surroundings. We noticed that he had a wound near the left eye. On closer inspection in the LCD screen of our camera, we concluded that it was a healing wound and might not be a great threat. But it was our duty to inform the concerned department and so we did. After a few moments he started moving again. This time he walked on the snake-like roots of mangroves, giving us some unique photographic opportunities.

We had been following him for almost ten kilometres. It was nearly 1:00 p.m. now, and we had reached a place where all the boats from Dobanki cross on their way back. Here the inevitable happened. Boats started flocking from all directions. Over 20 boats accumulated to catch a glimpse of the most elusive 'ghost' of the mangrove forest. However, the tiger didn't seem to be perturbed at all. He looked very hungry and the boatmen kept their boats at a safe distance. Sundarban tigers have a history of preying on humans and it would be a walk in the park for this massive male to take one

from the boat if they got too close. The tiger seemed to be at a strategic position too, as due to the low tide, boats were at a lower level, and the tiger higher. These agile cats can jump great lengths very easily.

Overall, the tiger had walked about 11 to 12 km. During this time, we were blessed with numerous opportunities to photograph him and observe his different behaviours. Out of my numerous sightings (50+ till date) in Sundarbans, this will remain etched in my memory. Tiger sightings are rare here and most of them are nothing more than a fleeting glimpse. We were lucky on this occasion that this elusive ghost gave us so many wonderful moments and that too for such a long duration. This sighting has made me fall in love with these mysterious mangroves in a much deeper and more meaningful manner. ■



Soumyajit Nandy is the Managing Partner of GoingWild LLP that organizes wildlife photography tours. This architect turned wildlife photographer specializes on Sundarban and its tigers.

Birding at Bhigwan



Woolly-necked Stork



Black-tailed Godwit



Black-winged Stilt



Greater Black-headed Gull

Text: **Shashank Birla**

It was dark at 4:30 a.m., but for us students of the 2014–2015 BNHS Basic Course in Ornithology, the much awaited 3-day field camp to Bhigwan had finally arrived. Priti Choghale, Centre Head, CEC BNHS and our

course coordinator had sent us a checklist of likely bird sightings, and noted birder, Nikhil Bhopale was to lead us on the trip. Everyone was looking forward to seeing the Greater Flamingos, but it wasn't just the flamingos we were after. Bhigwan, famous as the Bharatpur of Maharashtra,

is known to support over 200 species of birds across its wetland habitats as well as those of forest and scrub.

In order to make the journey from Mumbai more rewarding, we stopped at two more birding hotspots enroute, Kavdi Pat and Mayureshwar Wildlife Sanctuary, both located near Pune. Kavdi is about 20 km from Pune, just off the main Pune-Solapur highway. We parked our bus in a small hamlet and while walking the dirt track towards the waterbody, Nikhil emphasized that he would like us to take note of not just bird identification based on features, but also habitat and behaviour. We rounded a bend, and the wide expanse of Kavdi Pat became clear to us, a mix of wetland and scrub habitat. We were shocked to see that the area was subject to heavy human use by way of cattle grazing, washing of clothes, and even as

While we watched and photographed, Nikhil was showing us the birds in greater detail through his spotting scope. Suddenly he looked up, peered through his binoculars, and grabbed his scope, taking it closer to the waterside. Focusing through it, he crowed! In his list of over 900 species, this was a lifer (species never seen before), the Jack Snipe. All of us queued up to take a closer look, as he explained its defining characteristics: shorter bill, lacking the pale crown stripe of the Common Snipe, and a peculiar bobbing motion while it was feeding.

Elated with our sightings and after a quick lunch, we headed for birding at Mayureshwar Wildlife Sanctuary, a small scrub and thorn forest interspersed with grassland located in Baramati tehsil in Pune, and better known for Chinkara (Indian Gazelle). Cattle carcasses dumped in a



Greater Flamingos

a dumpsite. In spite of this, we could see a wealth of birdlife. Wagtails moved about among the rocks close to the water's edge. Nikhil asked us to observe them, and we narrowed down to identifying them as the White Wagtail and the Yellow Wagtail. He explained that we were unlikely to encounter Grey Wagtail, as they tended to be seen more around forest edges. Congregations of waterfowl were seen in the network of small streams across the habitat, the Common Teal, Ruddy Shelduck, Garganey, Indian Spot-billed Duck, and Northern Shoveler. Among the waders, we sighted Black-winged Stilt, Common Sandpiper, Wood Sandpiper, Red-wattled Lapwing, Red-naped Ibis, and Common Snipe.

particular area here are known to attract some large species of raptors. And sure enough, en route to the sanctuary gate, Nikhil stopped to examine a dark shape close to the top of one of the hills. Setting up the scope, we realized it was indeed an eagle, an *Aquila* sp. that, based on the length of the neck, was likely a Steppe Eagle. We explored the area and came across Green Bee-eater, Grey-necked Bunting, Southern Grey Shrike, Ashy-crowned Sparrowlark, and Indian Bushlark. We also saw a pipit, and this was one of the tougher groups of birds to identify, so Nikhil again asked us to observe the features closely. A defining character, prominent dark lores (mark between the eye and bill), was noted. Combined with the comparatively

uniform dull upperparts, unstreaked breast, and the habitat, we narrowed it down to the Tawny Pipit.

Post our sightings we turned to head back to the bus. As we made our way through the sanctuary gate and stopped at a point to explore the habitat more closely, we saw a whisk of movement among the trees, and peering closely, saw a group of Small Minivets. Nikhil once again advised caution in identifying the species, as another resident, though rarer, in this habitat was the

Short-toed Larks, a gregarious species. Soon, we made our way back to Baramati H.O. to retire for the day, and had a briefing with Nikhil at night, of plans for the next day and species to watch out for.

At 6:00 a.m. the next day, we started on our way to the highlight of our trip, Bhigwan. The first image that comes to mind when people think of Bhigwan is undoubtedly of flamingos in the backwaters, but it is so much more than that. Scrub and secondary forest, agricultural land,



Painted Storks



Purple Sunbird



Brown-headed Gull



Yellow-wattled Lapwing

White-bellied Minivet, identified by its distinctive white underparts and wing-panel [an orange (male) or yellow (female) wash to the underparts and wing-panel is seen in the Small Minivet]. We came across a few more species like the Bay-backed Shrike, Blyth's Pipit (identified by buff tips to the tertials, and a shorter tail in comparison to its body). As dusk set in, we saw flocks of Little Swifts and Barn Swallows flying over us. Near the dirt track, there was a group of smaller birds moving about in the dry grass. A closer look would reveal them to be Greater

and of course, the wetlands themselves, make for a mix of habitats that support an astounding variety of birdlife. We headed for a forest nursery, an area that was mostly composed of degraded forest. On foot from there, we made our way past cultivated fields and finally came to a view of the backwaters. Dawn had only just broken as we reached the nursery, and in the early morning light we noticed Large Grey Babblers up and about, along with Brahminy Starlings. Nikhil had told us of a Yellow-crowned Woodpecker that was regularly seen at a

particular spot, so that was where we were headed. In the distance, we noticed a medium-sized bird moving about on the ground, a closer look confirmed it was a Yellow-wattled Lapwing. Overhead, two large birds in the trees revealed themselves to be Indian Grey Hornbills. Ajay, one of the students in our group, had captured some amazing footage of their nesting behaviour, particularly the struggle of the female to enter the nest hollow (to incarcerate herself with her brood for two months) and

so named for its habit to twist and writhe its neck when disturbed. Its Latin name, *Jynx*, is also an allusion to the same behaviour, associating it with superstition. Looking around, we saw a Black-headed Cuckooshrike as well, a female, so named for its resemblance to two families, cuckoos and shrikes, in particular its bill. We heard the call of a *Ficedula* sp. (probably a Red-breasted Flycatcher) as well, a soft 'trrrr', again difficult to trace, but it did finally make a blink-and-miss appearance.



Indian Bushlark



Small Pratincole



Wood Sandpiper



Red-wattled Lapwing

the same in emerging from it, followed later by the chicks. Further on, we saw two Red-rumped Swallows perched on a treetop, differentiated from the Barn Swallows by rufous sides to the neck, streaked underparts (not always though), and as the name suggests, a red rump. We reached the spot where the Yellow-crowned Woodpecker was expected, but it didn't make an appearance. Nearby, however, in a clump of trees, movement was seen and the scope was set up. Some adjusting later, Nikhil exclaimed "Eurasian Wryneck!" A member of the woodpecker family, it is

The habitat changed as we walked, with cultivated fields on one side of the path, and we were treated to the beautiful sight of a small group of Red Munia (Avadavat). A Grey Francolin was heard calling in the distance in its now famous mnemonic, 'KapilDev, KapilDev, KapilDev!' A Paddyfield Pipit hopped onto one of the dried dung cakes outside a hut. Further on, we came across a few more species, Chestnut-tailed Starling, Rosy Starling, Purple Sunbird, Clamorous Reed-warbler, Common Chiffchaff, and White-browed Wagtail. Finally



AJAY GADIKAR

Birding is an exciting and enriching hobby

we reached the water's edge, where we had our first view of the water birds of Bhigwan. Asian Openbill, Grey Heron, Black-tailed Godwit, Black-headed Ibis, Glossy Ibis, Red-wattled Lapwing were among those immediately visible. A closer look revealed sandpipers. The Common Sandpiper was easy enough to distinguish, but the Wood and Green sandpipers were more of a challenge for us. Brown-headed Gulls and River Terns put on quite a show, snatching fish from the water, and for a while, there was the steady clicking of camera shutters. We got our first view of the Little Ringed Plover as well, a cute-looking bird with its distinctive running-and-stopping behaviour.

Another flurry of activity ... an Indian Nightjar had been sighted by Vikas. A hide-and-seek game ensued, as we looked for the beautifully camouflaged bird, and after a few of us were satisfied with some shots, we boarded the bus and left for the hotel for lunch. During the lunch break, Nikhil made a presentation oriented on bird identification, their shape, size, habitat, distinctive features, feeding mechanisms, migratory patterns, and calls/songs, a few of which he imitated with remarkable accuracy.

We headed out again for Diksal, for a closer encounter with the Greater Flamingos we had seen at a distance in the morning. On a busy road to Diksal, we filed out of the bus to have a closer look at the wetlands on both sides of the road. Indian Cormorant, Comb Duck, Lesser

Whistling Duck, Purple Swamphen, Black-headed Ibis, Ruff (and the female Reeve, one of the few species where the female is named differently) were among our sightings. In a small patch near the road, Nikhil noted a smaller bird. "Bluethroat," he called, peering through the binoculars, but as soon as we aimed to see it, it disappeared, only to reappear moments later, a male displaying its gorgeous blue throat. After a few more minutes, we were on our way again and the road became narrower now with the backwaters on both sides, with stunning numbers of avifauna. Finally, we caught a glimpse of the famous flamingos, though still at a fair distance. The stunning variety of waders included Painted Stork, Asian Openbill, Eurasian Spoonbill, Black-winged Stilt, Little Ringed Plover, and egrets and sandpipers. Brown-headed Gulls flew overhead, along with River Terns. To the right, way in the distance were the Greater Flamingos, with a few tourist boats drawing close to them. Further on, on the land were Bar-headed Geese along with a mixed flock of Glossy and Red-naped Ibis. The scene was serene, as the water and sky were bathed in the golden light of the setting sun.

Nikhil kept us focused on the behaviour of various species, whether it was the peculiar feeding habit of the Eurasian Spoonbill swinging its head from side to side or Little Ringed Plovers running across the mudflats. We



Ashy-crowned Sparrowlark

were also lucky to sight two new species with the scope, Kentish Plover and Little Stint. Temminck's Stint was also common here, and could be easily differentiated from the Little by its yellowish (*vs* blackish) legs. As the sun set further on the horizon, a huge flock of flamingos took to the air, giving all the photographers in the group some delightful frames. Flocks of Black-tailed Godwit also made fly-bys. What a glorious way to end the day! As we headed back to our hotel, discussions were animated on topics of photography and bird identification. Quite a few of us wanted to have a closer look at the flamingos, and planned to take the boat excursion the next morning. So, the next day, we headed to Kumbhargaoon, and after some piping hot tea, went to the water's edge, awaiting our boat. Eurasian Coots, Black-tailed Godwits, Grey Herons, Asian Openbills, and Black-winged Stilts were feeding near the water's edge. We saw a dead Checkered Keelback, and also a live one in the water, badly entangled in the aquatic vegetation. The man arranging our boat trip, Mr. Sandip Nagare, a well-known local bird guide, who has even put together a small booklet on the birds of Bhigwan, tried to rescue the snake, but the snake's situation was hopeless. Saddened, we boarded the boats.

It seemed the flamingos had flown off even further, so our boatman, sweating in the rising sun, picked up his pace, stroke after stroke. A variety of gulls, terns, and cormorants flew by, and we saw more waterfowl such as the Northern Shoveler, and even a new duck species for the trip, the Eurasian Wigeon. Finally, we drew closer to the flamingos, and had the opportunity to admire them at close range. After a while, the entire flock made an almost plane-like takeoff, after running together in the shallow water. This was one of the most



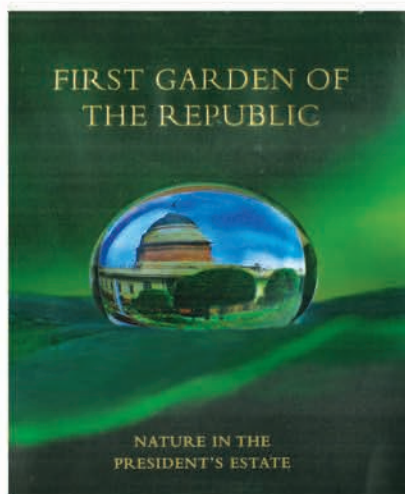
Green Bee-eater

memorable sights we would take back from this trip. Bhigwan seems to have benefited hugely from the annual gathering of flamingos, and while fishing does continue in the backwaters, ecotourism is now possibly one of the largest sources of revenue for the locals. Many of them have even imbibed excellent identification and birdwatching skills to serve as guides to both regular tourists and dedicated birdwatchers. With the increasing popularity of both birdwatching and photography, wetland habitats are witnessing footfalls like never before. Perhaps there are some hard lessons to take away from Bhigwan in terms of ecological sustainability and economic upliftment.

For us students – comprising a melting pot of an entrepreneur, advertising professional, school infrastructure developer, freelance photographer, professionals from the Oil & Gas sector, movie promotions and communications, HR professional in the chemicals sector, prominent automobile manufacturer, engineer, angel investor, business advisor, zoology student, and in the business of waste paper (me) – this was an immensely rewarding trip, not only for the bird sightings obtained, but for the immense knowledge passed on to us by Nikhil. And, Priti had ensured that we had a comfortable and enjoyable camp. With all this, we look forward eagerly to the next BNHS field trip. ■



Shashank Birla is a naturalist, writer, and photographer. He participates in citizen science initiatives and surveys. His works have featured in Sanctuary Asia, Nature in Focus, National Geographic Traveller India and Saevus, among others.



**First Garden of the Republic:
Nature in the President's Estate**

Edited by Amita Baviskar

Published by: Publication Division,
Government of India, New Delhi. 2016.

Size: 30 x 25 cm

Pages: 256

Price: Rs. 1940/-

Hardback

Reviewed by: **Asad R. Rahmani**

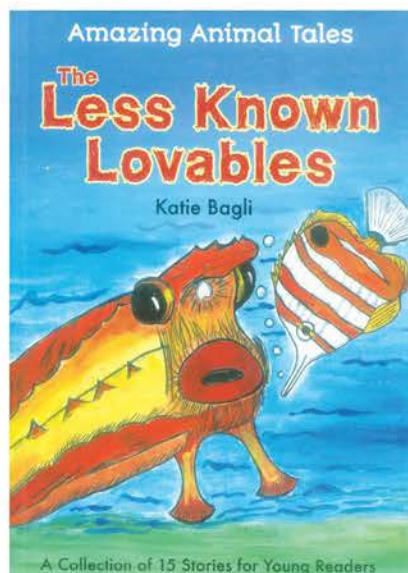
It would be an understatement to say that *FIRST GARDEN OF THE REPUBLIC: NATURE IN THE PRESIDENT'S ESTATE* is a lavish coffee-table book on the largest residence of a head of state anywhere in the world. The 330 acres on Raisina Hill in New Delhi houses the President of India, and his retinue of staff, offices, museums, auditorium, and one of the finest gardens in India.

Everything about the book is superlative – from design to language, and from the selection of images to writers. When we have Pradip Krishen writing on ‘Avenue and Forest Trees’ (chapter 3), can we expect anything less than a well-researched article embellished with lovely pictures. Pradip has done for Indian trees what Valmik Thapar, another great conservationist, has done for the Tiger: bringing to us the inner beauty and magnificence of biodiversity with which we share the earth. Can we think of life without trees? Even the magnificent Rashtrapati Bhavan would lose its grandeur without the tall *Jamun*, *Khirni*, *Pilkhan*, and *Karanj* trees that adorn several avenues of the Estate.

Ghazala Shahabuddin created a stir in her family when she opted for a career in wildlife. Now not only her family but the whole country is proud of her decision, as she has become one of the most dedicated and intellectual field biologists of India. Her two chapters, ‘Creatures Great and Small’ (chapter 5) and ‘Heirs of the Ecological Mosaic’ (chapter 6), are not only informative but generous with images, ranging from the charming Lynx Spider on a Canna bud, to the adorable Blister Beetle on a Gondni bush.

The BNHS conducted a one-year bird study in Rashtrapati Bhavan during 2002–03 and recorded 90 species of birds. In 2014, Thomas Mathew in his book *WINGED WONDERS OF RASHTRAPATI BHAVAN* added 28 species to the list. Ghazala has added another three species, bringing the total to 121. Her contribution ‘The Cycles of Life’ (chapter 7) deals with such seldom-discussed subjects as the aroma of sun-baked earth after the first rains, or the emergence of winged termites that create a bonanza of food for a host of birds that relish these nutrient-rich insects.

Three chapters by Amita Baviskar, the editor, on the history of the construction of Rashtrapati Bhavan, the garden, and what happens backstage to keep the garden alive, sets the tone for the book. The book is well-researched and provides details not known to the ‘hordes’ that visit the Mughal Gardens, when they are opened to the public every year. I am sure that people who have lived in this sprawling estate do not know so much about its history. Rashtrapati Bhavan, earlier the residence of the Viceroy of India, was built in the early 1920s by flattening Raisina Hill, which was covered with a thorn forest. The name Raisina Hill is the only reminder of that past, along with sepia-tinted images of the Viceroy and his guests which are preserved in the Rashtrapati Bhavan museum. I am sure no one misses the pre-Independence occupants! ■



The Less Known Lovables

By Katie Bagli

Published by: Shree Book Centre,
Mumbai. 2017.

Size: 20 x 13 cm

Pages: 158

Price: Rs. 199/-

Paperback

Reviewed by: **Priya Warekar**

Katie Bagli has authored a number of books for kids. The last one from her was *LESS LIKED LOVABLES*. The latest addition, *THE LESS KNOWN LOVABLES* is, as the title suggests, on lesser known animals of the world, like the red-lipped bat fish that it is found in the depths of the ocean. The book highlights interesting facts about lesser known animals, e.g., why are honey badgers called cave diggers. Each story starts with an enthralling suspense and the mystery unfolds in the end. One story that I found particularly gripping was about the snow leopard. It is so well written that I couldn't put the book down until the mystery was solved. The book also has interesting sketches of animals and birds.

There is one point that needs to be corrected if there is a reprint. The story about the Pig-nosed Frog is set in Lonavala, but this species is only found in some pockets of Kerala. Apart from this, the rest of the book is exciting for readers of all ages. The book shows respect for lesser known creatures and the reader will not just be amazed but will fall in love with them. I am sure that like me, many will Google some of these animals to learn more about them. The book serves its purpose of upgrading the status of "*THE LESS KNOWN LOVABLES*" to that of well-known for gen next. ■

ABOUT THE POSTER



Coral Reef Ecosystems

Coral reefs are limited to tropical coastlines, occurring in waters not too deep or muddy for photosynthesis. They are built by colonies of tiny animals, and as the reef structures mature, and depending on the geologic and oceanic influences, they develop into fringing reefs, barrier reefs, or atolls.

Coral reefs are nature's own frontline sea defences, self building, self repairing, and solar powered. They do the job for nothing and provide homes for more than a third of all the fish species of the world, and a myriad other marine fauna.

Often called "rainforests of the sea", their destruction or decline places thousands of species at the risk of extinction.

Coral reefs are fragile, and human activity has destroyed decades of coral growth, putting reefs throughout the world at risk. Irreparable damage has occurred to the coral ecosystems as a result of overfishing and blast fishing, coastal development, coral mining, agricultural and urban runoff, pollution (organic and inorganic), digging of canals and access into islands and bays, and high impact tourism, among others.

Coral bleaching is a phenomenon best described as whitening of corals as they expel the algae (zooxanthellae) living in their tissues due to stress from changes in temperature, light or nutrients. This is a significant threat in recent times, and is the fallout of increase in frequency of El Nino. Indian reefs have witnessed three bleaching events since 1998 which caused significant mortality of corals, the most recent being in 2016 that majorly affected the west coast. Recovery of corals from El Nino related bleaching usually take a couple of decades. Increased frequency of such events has put all reefs across India in serious risk.

In India, coral reefs are found in the Andaman & Nicobar Islands, Gulf of Kachchh, Gulf of Mannar, Lakshadweep, and in patches in the waters off Maharashtra, Gujarat, and Karnataka, including an offshore reef of Angria Bank in Maharashtra, which is about 40 km long and 20 km wide. ■



Coral Reef Ecosystems



A CHRONICLE FROM KAZIRANGA

Text and Photographs: **Rahul Khot**

Food is one of the primary physiological needs of all living things, which have evolved various strategies to gather it. Predators go to extremes and have developed unique skills to hunt prey. Occasionally, a larger predator takes advantage of its size and strength to steal food from a smaller one. I witnessed one such episode at Agoratoli Range in Kaziranga NP, Assam, on February 28, 2015.



1. Around 3:30 p.m., I spotted a Hoary-bellied Squirrel on a Silk Cotton tree, being closely watched by a Changeable Hawk-Eagle from another branch of the tree



2. After a short spell of hide and seek, the squirrel failed to recognise the hawk-eagle's plan and was caught in its deadly claws in a fraction of a second



3. The hawk-eagle descended to the ground with its prey grappled in its claws, killing the squirrel instantly



4. With the dead squirrel in its clutches, the hawk-eagle returned to the same branch from which it had sprung into action



5. Another raptor, a Steppe Eagle, was watching the whole drama from a vantage point on another tree



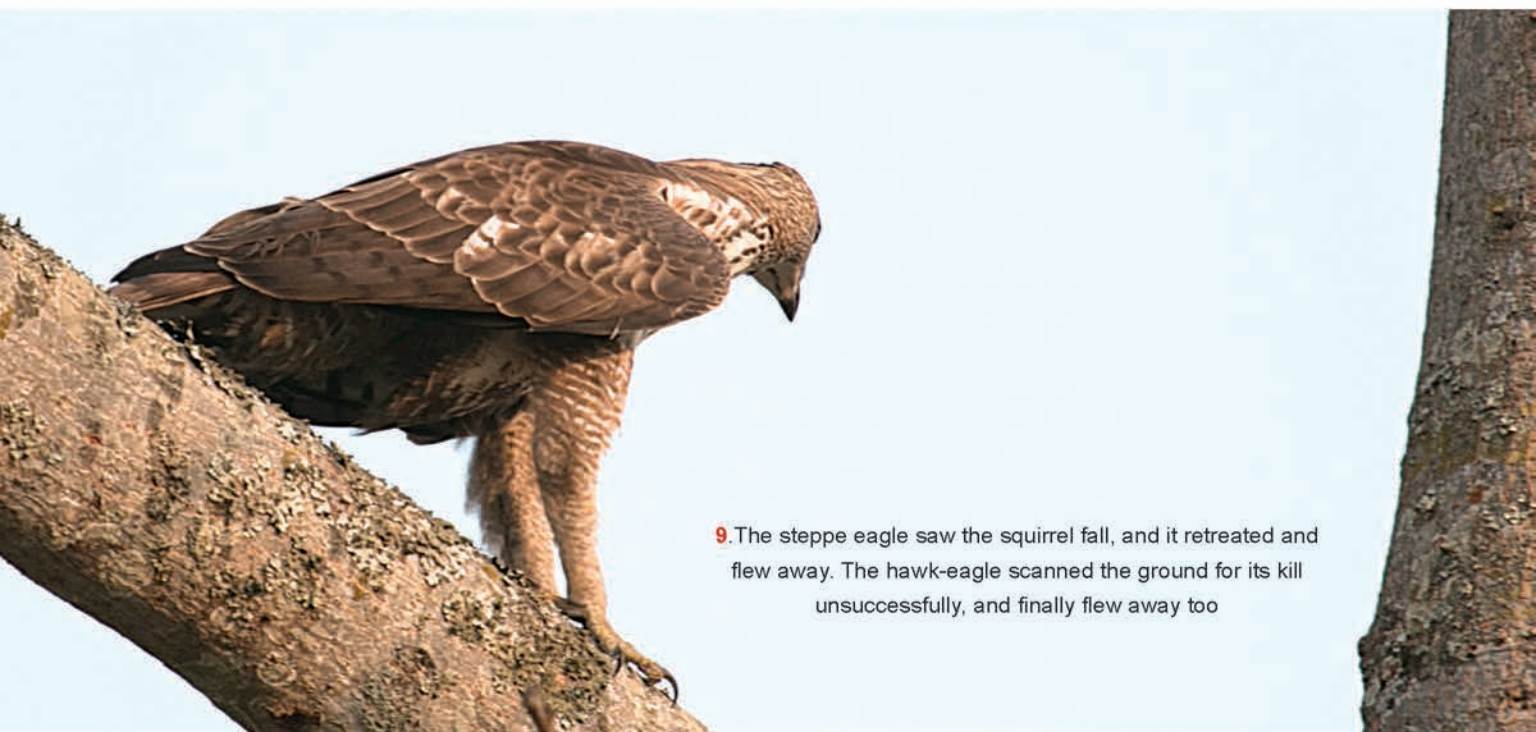
6. The hawk-eagle sensed the presence of the bird above, and flew from the thick branches to less dense branches of the tree. It made every attempt to save itself and its precious kill from the intruder



7. Precipitously, the steppe eagle went airborne and started circling the tree where the hawk-eagle was sitting with its prey



8. The hawk-eagle was no match for the steppe eagle which was almost thrice its size and strength. The intruder launched its attack on the hawk-eagle with swift precision



9. The steppe eagle saw the squirrel fall, and it retreated and flew away. The hawk-eagle scanned the ground for its kill unsuccessfully, and finally flew away too

This entire episode was over within a couple of minutes. How ironic it was, that the squirrel lost its life but the two hungry raptors had to begin their hunt all over again!



Rahul Khot is currently working as Curator with BNHS. He heads the Natural History Collection department, and is involved in biodiversity monitoring and citizen science projects of BNHS.

Poona Skink in Nashik, Maharashtra

Bondara Hill (900 m above msl) lies 18 km west of Nashik, Maharashtra. The hill has grassy slopes on all sides dominated by *Cymbopogon martini* and *Heteropogon contortus*. Midway at about 450 m, there are remnants of an old plantation of teak and eucalyptus, now reduced to dry stumps less than one metre high.

On June 26, 2016, while trekking up the hill, we noticed a few lizards scampering on the ground feeding on a swarm of termites emerging from a small burrow. On approach, we noticed that among them was a skink that looked different from the skinks

that one commonly encounters in Nashik. We took pictures and sent them to Dr. Deepak Apte (Director, BNHS), who got the skink identified though the Society's herpetologist Mrugank Prabhu as *Eurylepis poonaensis*, the Poona Skink. After posting the images on Facebook, we also got further confirmation from Sujoy Choudhari (who has sighted the species in Satara) that the specimen in the photograph was very likely to be the Poona Skink.

On checking literature, we learnt that this was the first sighting of the species from Nashik district and also

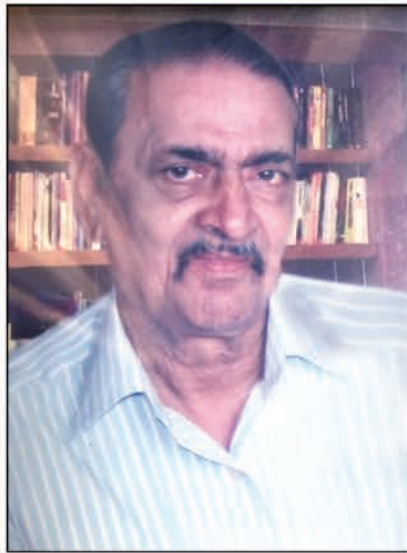
that it is a rare species. It was first described from Pune (hence its name Poona Skink) based on a specimen collected from Katraj Ghat by R.C. Sharma in 1970. The rest of the few records of this species after that are between 2006 and 2007 from Saswad, Chaturshringi, and Katraj in Pune district, and from Jejuri in Satara district by Vivek Gour-Broome, at elevations of 600–800 m above msl.

We tried to publish our new record in a scientific journal, but the manuscript was not accepted, as identity of reptile and amphibian species needs to be authenticated with voucher specimens. Since permission for collecting any specimen of wildlife is required from the Forest Department and State Biodiversity Board, we were handicapped in this regard. However, since it is very likely from the views of experts that our record is of the Poona Skink, we would like to publish our finding through the pages of this popular magazine, *Hornbill*, and we request readers to keep a lookout for this rare species during their field trips. And maybe, the confirmation of its identity will be established in the near future by herpetologists through specimen collections. ■

Bishwarup Raha & Harsh Tanna
Nashik, Maharashtra



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Dr. Marselin Rosario Almeida
(18.06.1939–05.12.2017)

Dr. Marselin Rosario Almeida, one of India's most experienced, talented, and influential plant taxonomists, passed away peacefully at his residence in Mumbai on December 5, 2017. He is survived by his spouse, Dr. Saramma Almeida, three children, and four grandchildren.

Born on June 18, 1939 in Sawantwadi, Sindhudurg district, Maharashtra, Dr. Almeida studied in the local Kalsulkar English School. On completing his S.S.C. in 1959, he came to Mumbai and joined St. Xavier's College as a Laboratory Assistant in the Botany Department. While working in that capacity, he graduated in Botany in 1965 and completed the Library Training Course from Bombay Library Association in 1968. He joined Blatter Herbarium (BLAT) as Herbarium Assistant, and it was here that he gave the first indication of his talent, finding two new species of grasses in the herbarium collection. In 1972, he received his M.Sc. degree from Mumbai University for the thesis "Contributions to the Studies of Vascular Plants of Maharashtra: Revision of the Pteridophytes of Bombay (Maharashtra and adjoining Southern Contiguous area)".

During his tenure at Blatter Herbarium (1967–1972), he found his soul mate in a young botanist, Saramma Varghese, who also became his collaborator in his botanical pursuits, particularly on the flora of Sawantwadi district. At Blatter Herbarium, the young Marselin was mentored by the renowned botanist Rev. Fr. H. Santapau,

and also had active interactions with the staff of the Botany Department.

Dr. Marselin Almeida joined CIBA Geigy Research Center as Botanist, where he worked for eight years. Subsequently, he joined ICI India Ltd Research & Technology Centre at Navi Mumbai, retiring at the age of 58. His work involved travelling all over the country in search of plant material required for analysis. This sharpened his knowledge of plant distribution, variation, and his ability to identify plants in the field.

Research students working under Dr. Saramma Almeida, Head of the Botany Department and Director, Blatter Herbarium, also benefited from being mentored by Dr. Marselin Almeida. In 1983, BLAT became the only institution in Maharashtra to participate in the Botanical Survey of India's District Flora Project. During this stint, he would visit Blatter Herbarium and Library to work on his dream project, the FLORA OF MAHARASHTRA. He helped the Herbarium to get projects, under which he mentored research students, one of the projects being a floristic survey of Nandur Madhmeshwar. Through the efforts of Dr. Almeida, in collaboration with World Wide Fund for Nature, India, Forest Department, Nasik, and BNHS, the Nandur Madhmeshwar area was notified as a Wildlife Sanctuary by the Government of Maharashtra in 1986.

Other projects and surveys which Dr. Almeida brought to fruition include: a consultancy project with the National Tree Growers Cooperative Federation Ltd, Anand, Gujarat in the 1990s; Vegetation Survey and Environmental Impact Assessment of Rashtriya Chemicals and Fertilizers, Thal, Raigad district in 1993; a status report on the biodiversity of mangrove vegetation at RCF, Thal in 1996; a report on the reassessment of Green Belt Development Study of RCF, Thal in 1999; and a report to UNDP on "The Development and Use of Natural Dyes in Textiles" in 2001.

From 2010 to 2017, he was a member of the Board of Studies in Botany at St. Xavier's College (Autonomous), Mumbai. Other than the Blatter Herbarium, Bombay Natural History Society was fortunate to have him as a Life Member from 1974. He often recounted that his interactions with BNHS stalwarts like Dr. Sálím Ali, Humayun Abdulali, J.C. Daniel, and others were a great inspiration for him. He led many BNHS nature camps and trails, where his vast knowledge of plant taxonomy and his identification skills, coupled with humility and patience, soon made him a very popular, respected, and

sought after BNHS member, inspiring many to take up the study of plants.

In January 1984, he was elected to the Executive Committee of BNHS and he continued to serve on it until March 1998. He headed the Research and Collections Subcommittee from 1994 to 1996, and also served as a Member of the Governing Council of Sálím Ali Centre for Ornithology and Natural History (SACON), Coimbatore from September 1994 to March 1999. During his second spell on the BNHS Executive Committee from April 2004, he was nominated as Vice President from 2005 to 2007. He was re-elected to the BNHS Executive Committee from 2010 to 2015.

During his early years with BNHS, he had started a small herbarium in BNHS, which was later shifted to Blatter Herbarium. He was a Member of the Scientific Projects Committee of BNHS and Botany Editor for *JBNHS* for several years. In 2006, along with Naresh Chaturvedi, Curator of BNHS, he coauthored *THE TREES OF MUMBAI*, describing 108 tree species commonly found in the metropolis.

Other than these distinctions, he was the Advisor to projects of WWF-I, conducting Nature Education Camps for school and college students. He was also a University of Mumbai research guide for Botany at BNHS. He conducted several plant taxonomy workshops at Blatter Herbarium, and was a visiting faculty for taxonomy at North Maharashtra University, Jalgaon. In recognition of his skills, the Department of Forests, Government of Maharashtra appointed him as a member of the Committee for the Collection, Cultivation, Processing, Value addition, Marketing and Export of Medicinal, Edible, Dye yielding and Aromatic Plants from 2006 to 2009. He was also Advisor to Mumbai Heritage Conservation Committee (MHCC) 2010 and a member of a committee formed by BMC for the establishment of a botanical garden in Mumbai. With his team of young Ph.D. and M.Sc. students from St. Xavier's College, he completed the "Trees and Vegetation Survey" of Veermata Jijabai Udyan, Mumbai in 2010.

After retirement, he bought a plot of land in Sawantwadi, his hometown. With the help of his students, he planted many rare and endemic plants on this land. It was his dream to make this place a conservation centre, which unfortunately remains incomplete. He established the Magdelin Almeida Environmental Centre at Sawantwadi in memory of his late mother. He wanted to conduct educational trails and nature camps here and did manage a

few trips. Along with the Indian Botanical Society, a three-day National Seminar was held at this Centre. The Centre today holds a collection of about 10,000 specimens of flowering plants and about 5,000 books on botany, which now need a caretaker in his absence.

History will remember Marselin R. Almeida as the author of the *FLORA OF MAHARASHTRA*, a 6-volume work which took him 20 years to complete, 1996–2014. This *FLORA* enumerates 5,528 species belonging to 2,174 genera and 215 families. It is worth mentioning that the total number of species listed in this work exceeds that in the Botanical Survey of India's *FLORA OF MAHARASHTRA* by 2,394, and is almost double that of T. Cooke's flora of the *PRESIDENCY OF BOMBAY*. This is the best indication of Dr. Almeida's unparalleled field experience.

Dr. Almeida authored 28 scientific papers on Indian Botany and named or renamed more than 350 plant species. He described 14 new species and 16 new varieties of flowering plants. After his retirement, he continued to contribute to Indian taxonomy in the form of books – *DICTIONARY OF GENERIC NAMES OF FLOWERING PLANTS AND FERNS IN MAHARASHTRA*; *KONKANI NAMES OF PLANTS (with comments on hortus malabaricus)* (2007); *DICTIONARY OF SPECIFIC EPITHETS (with their meanings, local and sanskrit names)*; and *HANDBOOK OF DISEASES AND THEIR HERBAL REMEDIES* (2010).

Under his able guidance, the Forest Department, Maharashtra, published several books: A checklist of plants of Ahmednagar district (2007); A checklist of plants of Nasik district (2010); A checklist of vascular plants of Gadchiroli district (2013). Most of his books were published by Blatter Herbarium and/or by the Magdelin Almeida Environmental Centre, Sawantwadi; the copyright of these books lies with Blatter Herbarium.

Dr. Almeida's passion for plants and his work for the environment brought him several recognitions and awards: the D.Sc. degree awarded by the University of Mumbai in 2003 for his monumental work—the *FLORA OF MAHARASHTRA*; "Mumbai Gaurav" by Rotary Club of Mumbai in 2009; the "Green Teacher Award", along with Dr. S.M. Almeida, from Sanctuary Asia and Royal Bank of Scotland in 2009; the Fr. Santapau Gold Medal by the Association for Plant Taxonomy of India in 2010; the "Vasundhara Award" 2012, and the "Man of the Trees Award" by the National Society of the Friends of the Trees in 2017. ■

Rajendra D. Shinde



MUNIB KHANYARI

A Group that Feeds Together, Sticks Together

Text: **Munib Khanyari**

The October sun beat down on the Garhwal Himalaya in Mandal valley. The occasional glacial winds sweeping down from Rudranath peak were a deceptive relief. This quaint village of ragi, rice, and sorghum farmers along the holy route to Kedarnath was brewing up to become a battleground.

Autumn brings with it the harvest of ragi and sorghum, which the locals grind into flour and barter for salt in the nearby Gopeshwar market. “The *chapatis* from this flour are very valuable,” stressed Harish Bhaiya, a local. As the workers took their afternoon break around noon, heading home to re-energize, eat and rest, a brooding silence enveloped the terraced fields in the mountain’s lap. These fields and their adjacent forests are also home to a troop of Central Himalayan Langurs. Himani Nautiyal, a young researcher from Garhwal had been studying the virtually unknown Central Himalayan Langur *Semnopithecus schistaceus* in and around Kedarnath Wildlife Sanctuary. She was familiar with this particular troop (named rather un-creatively as the Mandal group) and

knew it well. The troop's preference for the village surrounds made it easier for her and her team to study them at close quarters.

It's fair to say that the troop had a lazy morning. Apart from the occasional grooming, shenanigans by the impatient infants and the grimaces of the males, our langur group seemed very comfortable in an oak tree on the adjacent mountainside. Mukhari, the huge male leader, sat far behind on a solitary perch with a view of the whole troop and the fields beyond. Autumn's harvest meant supplemental nutrition for the rigours of the mating season for the langurs. Or were ragi's supposed aphrodisiac properties to blame for its popularity?

Nani, a senior female, sensed the opportunity to raid the fields, seeing that the humans had left. Hunger-filled bellies made each individual of this group of 30-odd members make their way silently down from the cliff; lunch time each day was a mission. Infants clung to their mother's belly, Hari, another male, jumped from tree to tree, perhaps with joy of knowing that lunch was being served (well, raided actually!). The one-handed sub-adult Special stuck closely to his 'girl friend', Abhi, a sub-adult female. Dev, a contender to the dominance of Mukhari, sat in his quintessential 'mouth-open' stance on a rock in the field.

The long stalks of ragi and sorghum made the langurs inconspicuous among them. Even as the infants frolicked and jumped from rock to rock, the feeding frenzy had a tense air to it. Getting caught in the act meant receiving a shower of stones from the villagers, or even worse, being chased by Kallu and his gang.

Kallu was a self-appointed leader of the shepherd dogs that were mandated to protect Mandal.

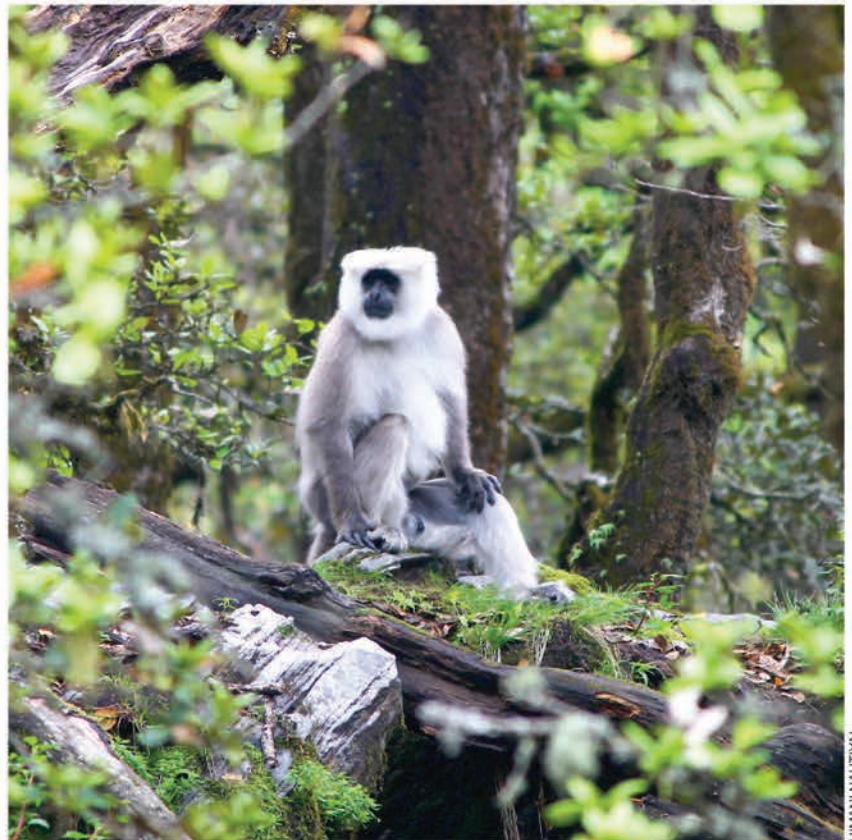
Tolerating a bunch of monkeys raiding their owners' fields was unacceptable to Kallu and his gang. Himani and I sat in the shade of a gigantic fig tree, observing the raid. The tranquil but hot afternoon air seemed to be locked in time ... only to be pierced by the barks of seemingly rabid beasts. Kallu and the gang had spotted the marauding langurs!

Each bark and leap had a reverberating impact, causing the unified group to panic. Females grasped their babies and leapt, and males cried out and tried to maintain order (without much success). The field's bounty was also a trap; the discontinuous tree line meant that a swift escape to the safety of the cliffs was nothing less than playing Russian roulette with the dogs.

In their panic from the barking, the group dashed for the nearest trees.

Mukhari and Dev led the majority of the group, bounding across the field to the nearest cliff and onto the oak trees. Hari seemed panicky and indecisive... was it his youthful inexperience that confused him? The nearing dogs meant a decision was needed... a quick decision. He, along with a group of three females, their babies and two sub-adults, jumped onto the nearest fig tree. Safe from the angry dogs below, this fragment of the troop was safe, but temporarily.

This fig tree was like an isolated island in an ocean of ragi and sorghum. A dash to actual safety meant running across the ground, perhaps more than 200 m to the trees and cliffs beyond. Being on the ground meant shooting themselves in the foot – Kallu and his pack's speed and agility would leave the group with little chance of escape.



A male langur watching over his troop entering the field

HIMANI NAUTYAL



HIMANI NAUTYAL

Langurs are known to live in close-knit social groups



MUNIB KHANYARI

Apart from agriculture, many households in the Mandal valley herd livestock

Ironically, in that very moment, calm enveloped the air. The dogs stood erect, facing the tree top, their barks now silent. Hari and the female sat in the canopy and in the distance Dev, Mukhari, and the remaining langurs had settled onto their safe perch. This calm was just a breather ... a solution was needed. A fragmented group meant insecurity, something needed to be done.

Rather anticlimactically, Kallu and the gang sat down under the tree, guarding the stranded langur troop with hubris rather than vigilance. As

the minutes rolled on, the notorious sub-adult, Special, a member of the stranded group, decided to get a move on. He precariously jumped to the edge of his tree haven, almost teasing Kallu to retaliate. Was it Special's proximity or his defiance that agitated Kallu, and prompted the barking to resume? Tails started wagging and ears were erect. Special, ever so often, jumped back and forth from the safety of the canopy to the brink, each time irritating the dogs even more.

Something was surely about to give, but we weren't sure what! In this

confusion of barks and jumps, we saw the brave Mukhari leap from his safe perch and run diagonally, straight down the cliff towards the adjacent fields. The dogs, perhaps more out of confusion than reason, began the chase. How dare the old man jump right in front of their eyes, risking everything, into the very fields that they were protecting, whilst his group was being held hostage?

In the frenzy of the dogs chasing Mukhari downhill, Hari saw an opportunity. He jumped from his perch to the ground and raced to a tree between his initial perch and the cliff beyond. The rest rushed after him, right onto the cliff and to the safety of a unified group. Only when the last stranded member had got across the fields did Hari leave his perch to head for the security of the cliff, joining the reunited group.

In the confusion of all this movement, Himani and I were stunned to see a rather proud and nonchalant Mukhari hop in front of us, above the chaos of barking dogs. He casually strolled to the edge and looked at the agitated canids below. Did Mukhari outrun the dogs? Why did they look so confused and disorganized? I could almost sense the laughter of success in Mukhari's demeanour, as he hopped across to rejoin his troop on the adjacent cliff. Kallu and his gang were left panting in the hot October sun. A brief silence encapsulated the moment when Mukhari leapt onto the cliff to be among his troop. The barking had now stopped and Dev led the group towards the oak forests beyond, to settle in for the night. ■



Munib Khanyari is a wildlife researcher interested in studying population dynamics of mammals in the Indian Himalaya.

The Missing 'Imperial'

Text and Photographs: **Udayan Rao Pawar**

I have been yearning to see Imperial Sandgrouse now called Black-bellied Sandgrouse in Rajasthan for the last four years, but have returned disappointed from each of my visits to the Thar. The following is an account of this year's trip, which is an extension to my earlier article (*Hornbill*, Jul-Sep 2013) on sandgrouse and their decline in the Thar.

On the eve of my journey from Jodhpur, I sat amazed, listening to my cousin, an officer in the Indian Army, narrate memories of the incredibly rich wildlife of the past. Sipping tea at the historic building of Jodhpur Lancers, now an army mess, which stands on the embankment of a small lake not very far from Umaid Bhavan, he pointed out to a rocky hillock that was said to earlier abound in Caracal. He also recounted the abundance of bustards and floricans in the grassland *beeds* of his village near Jodhpur, and also sightings of huge flocks of sandgrouse during his childhood days.



Black-bellied Sandgrouse



Asian Houbara



Greater Hoopoe Lark

Leaving Jodhpur, as my father and I sped towards the western part of Rajasthan deeper into the Thar on its fine network of roads, we came across a number of road fatalities including a Chinkara, Blackbuck, and Wild Boar. On one occasion, we saw a speeding vehicle narrowly miss a Chinkara fawn as it hesitatingly dashed across towards its mother who was waiting anxiously on the other side of the road.

Nearing Pokhran, we saw a large signage of a real estate firm offering plots for sale, these quite near the salt flats where my father recalled having seen flocks of Imperial Sandgrouse. At Lathi, which we reached shortly afterwards, he remembered seeing Cream-coloured Coursers running about near the railway station as he alighted from the train some 40 years back as a teenager.

Much has changed now. Human presence has increased and is evident even in the remotest corners of the Thar, where wildlife has dwindled. The road to Jaisalmer skirts the sprawling firing range of the Army, which is free of human habitation, and I wondered if a way could be found to preserve this vast stretch of desert and protect its wildlife. Could this responsibility be given to an 'eco' task force of the Territorial Army or to ex-servicemen?

At Jaisalmer, we enquired with the forest department about the Imperial Sandgrouse and were vaguely told to explore the area beyond Ramgarh. Looking mainly for these birds, we scanned the countryside during the day and camped in tents at night near waterbodies, mainly old ponds, but also seepage wetlands and large 'canal reservoirs'. The latter are large waterbodies created in the midst of the desert by diverting surplus canal water, such as the one in Ghantiyali near Mohangarh, which comprises a string of interconnected lakes several kilometres long with dense stands of Israeli/Umbrella babool (*Acacia*



A party of Bawariya tribals setting out on a hunt

tortilis) on its banks to stabilize the sand dunes. There were several boats of fishermen from Gonda (eastern Uttar Pradesh) hauling a rich catch of Rohu and other carps, who told us that the lakes have recently been cleared of Water Hyacinth (which also clogs the Indira Gandhi Canal) at a cost of Rs 20 lakhs. Although there were lots of waterfowl, we saw only a single flock of Chestnut-bellied Sandgrouse swooping down for a drink. Imperial Sandgrouse were nowhere to be seen. On enquiring with locals at several places, we were told that the 'Gattas' had not arrived for the last four years because of poor rainfall and drought, which has resulted in poor growth of *Bekar*, *Beeda*, and *Lani*, whose seeds are an important part of their diet. How do these migratory birds learn of the local conditions? The local people believe that arriving flocks carry the news back and the migrating flock is diverted to areas with more suitable conditions!

Our trip was not entirely disappointing, for we saw a number of Asian Houbara (Tilor). They were extremely wary because of heavy hunting, diminishing all attempts to photograph them. Locals spoke of hunting parties from Punjab and Haryana, big cities like Jaipur and Jodhpur, also local politicians. The hunters are known to ride across in four-wheel drive vehicles, each carrying several shotguns, and take shots as soon as a bird is flushed out. The bird is slow to rise and is easily shot. If it manages to get away, the vehicles close in on the place it lands. The bird invariably squats, and is approached by going around in reducing circles, gradually narrowing the distance. It is similar to the Tilor hunting technique one reads about in old shikar literature, using camels and muzzle loading guns. We were told that



Indian Fox

the birds are also hunted at night with spotlights, as they select open patches to roost, to avoid being preyed upon by desert predators like foxes and cats. Although we did not see the hunting parties, several places had marks of vehicle tracks. Experienced trackers / hunters can track the Tilors from their footprints. Surprisingly, most of the sightings we made were in grazing grounds with a lot of dung litter, and only a single one in an area with *Ber Ziziphus jujuba*. The local trackers told us that Tilors are equally fond of dung beetles and *ber* fruit.

While specialized desert species like sandgrouse and bustards have suffered due to the combined effects of hunting and loss of habitat, some of the more adaptable species like Nilgai and Wild Boar have fared much better. Interestingly, most farmers, both Hindu and Muslim, anxious to protect their crops and perhaps due to religious feelings and to escape prosecution, rely on Adivasi hunters to eliminate these marauders from their area. At Mandha, we saw a group of shikaris of the Nath

community with a pack of dogs, and a few days later, at Bhojasar, we came across a similar group of Bawariya tribals, most of them armed with light spears, setting out to hunt. We also stumbled upon their recent campsite, which had pluckings from francolins and feathers of a large bird which we could not identify, as well as the remains of a Chinkara.

Unable to sight the Imperial Sandgrouse, we wound up our trip and drove back with heavy hearts. My spirits were lifted on seeing several Chinkaras grazing fearlessly by the side of the highway as we passed a Bishnoi area. I hope that someday we will all learn from the Bishnois and live in harmony with nature. ■

Eds: Imperial and Spotted sandgrouse were finally spotted last winter (2016–17).



Udayan Rao Pawar is a student and a wildlife enthusiast and photographer.

Land of the Rising Sun

Text: **Murali Krishna, Awadhesh Kumar, Parimal Chandra Ray and Kuladip Sarma**

Arunachal Pradesh, popularly termed as “The Land of the Rising Sun” is blessed with a rich ethnic cultural diversity, and is home to 25 major and 110 sub tribes. A hill state, it is located in the easternmost part of the Himalayan range. About 96% of its landscape comprises hills that act as natural boundaries for the different indigenous communities of the state. Apart from this, it is a land blessed with a variety of forests ranging from lush tropical rain forest to alpine scrub.

Arunachal Pradesh has 13 protected areas, including one Biosphere Reserve, the Nandapha National Park, a popular protected area that is home to a few endemic and several threatened flora and fauna. The Park has drawn our attention since 2010 when we started studies on Western Hoolock Gibbon, White-bellied Heron, and gliding squirrel species. In 2014, the Rufford Foundation recognised our work and funded our proposed study of nocturnal frugivores under their Small Grants for Nature Conservation programme.

Nocturnal Species of Interest

Nandapha National Park (1,985 sq. km) is a well-known tourist destination, especially for birdwatching. Most tourists enjoy the wildlife during the day but miss the beauty that is revealed only in the night. The forests are silent in the dark, but if the canopy is scanned closely with headlamps, the jungle has a lot to offer. The Park supports seven species of gliding squirrels, namely Red Giant Gliding Squirrel, Red and White Giant Gliding Squirrel, Indian Giant Gliding Squirrel, Nandapha Gliding Squirrel,

A leopard cat with orange and black spotted fur is sitting on a large, smooth, light-colored rock. The cat is looking directly at the camera with a calm expression. The background is a dark, textured wall, possibly a cave or a forest interior. The lighting is soft, highlighting the cat's fur and the rock.

Leopard Cat is commonly sighted during monsoon

Spotted Giant Gliding Squirrel, Yunnan Giant Gliding Squirrel, and Particolored Gliding Squirrel. Spotted Giant Gliding Squirrel is found in the upper reaches at higher elevations. Namdapha Gliding Squirrel – an endemic to the Park – has not been sighted till date after its discovery. The other gliding squirrel species are rare and may occur in the forests of bordering Myanmar. Apart from gliding squirrels, six species of civets were recorded by us in the Park during night surveys, namely, Large Indian Civet, Small Indian Civet, Common Palm Civet, Himalayan Palm Civet, and the rare Binturong and Small-toothed Palm Civet.

The gliding squirrels and civets feed on the fruit of different plant species such as *Neolamarckia cadamba*, *Chukrassia tubularis*, *Gynocardia odorata*, *Duvabanga grandiflora*, *Canarium strictum*, *Altingia excelsa*, *Ficus* sp., and *Castonopsis* sp. among others, thus helping in seed dispersal. Being hypocarnivores, they also feed on several kinds of animal matter, mainly small mammals and birds, thus playing a dual role in maintaining ecosystem functions. Another nocturnal attraction is the Bengal Slow Loris. It is the only nocturnal primate found in northeast India. Leopard Cat is another species easily spotted in the night. It is commonly sighted during the monsoon as it comes out to feed on crickets in that season.

Threats to species in the Park

Traditionally, hunting was for the table, and a few species were hunted for ethno-zoological and ritual purposes. Air guns, catapults, and snare traps are used for hunting. The tribals inhabiting the borders of the Park, mainly the Lisu, Chakma, and Mishmi, do not have proper road connectivity with the nearby towns and local market places, which limits the marketing of cash crops that they grow. This has also limited them from availing governmental facilities like proper education, sanitation, drinking water, and medical facilities. These factors have led to hunting of wildlife in the Park, which is the reason for the overall decline in wildlife populations. Apart from hunting, developmental activities inside the Park like road construction and widening, and encroachment



Bengal Slow Loris – a nocturnal primate

of forest area, are indirect threats to mammalian species and their habitats.

Conservation Initiatives Required

The Forest Department has recently started a Tiger Protection Force for patrolling within the Park, thus reducing poaching pressure. However, since most of the Park is unexplored due to harsh terrain and rough waters during rains, it becomes impossible to patrol the entire Park throughout the year. Increased funding to set up and operate permanent camps, along with upgrading of weapons, will help the forest department to protect wildlife and habitats more efficiently. In addition, local



Common Palm Civet



Red Giant Gliding Squirrel

peoples' participation and support in protection and conservation of the Park's wildlife is also urgently needed to strengthen the conservation efforts of the forest department.

Educational and awareness programmes about wildlife conservation and its importance need to be conducted to educate the tribal population living in and around the Park, necessarily involving local political leaders, Gaun Buras (village head), and local stakeholders. The economic benefits of conservation programmes will also have to reach them so that they benefit from their participation in nature conservation activities. The concept of developing ecotourism and home stays should be promoted to directly benefit locals. Such economic benefits will transform hunters into conservationists, and local youths to tourist guides.

The Conservation Team

The local authority of Namdapha National Park, the forest department, will be the primary organization for conservation and management of the Park's wildlife. They will require the support of local, regional, and national level non government organizations. Another important resource would be the researchers/scientists working in and around the Park, as they have scientific data on its ecology and other aspects. The researchers/scientists should be involved in spreading awareness on the importance of wildlife among the local communities, and the need and benefits of conservation. Additionally, all the aforesaid groups and organizations need to highlight the importance of Namdapha National Park on a broader scale, to make it a major destination for responsible ecotourism in northeast India. This will not only help in generating employment avenues and in improving livelihood standards of the locals, but also in species conservation.

Acknowledgements

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Conservation challenges in urbanizing landscapes



Greater Flamingo in an urban landscape

Text and Photographs: **Saunak Pal**

The world that we live in is changing dramatically, and a large proportion of the global population is moving to cities. It is estimated that by 2030 about 60% of all humanity, i.e. nearly 5 billion people, will be living in urban areas due to migration and population growth. This rapid urban expansion, besides having significant implications for human society, will also impact the natural world. Given the pace of urbanization and population increase, changes in natural habitats due to development will become inevitable. However, it is binding on us to prevent as much irreparable loss to the existing natural flora and fauna as possible.

The most direct impact of urbanization on biodiversity is the change in land cover that comes with development. This change in land cover in turn has considerable impacts on temperature and precipitation in and around urban areas. It also influences many factors that impact water quality, including erosion, nutrient loading, and biogeochemical cycling. In many cases, natural habitats have a lower rate of erosion and greater capacity to absorb excess nutrients and pollutants than anthropogenic (human-altered) habitats.

Urbanization impacts biodiversity directly through physical expansion over land, and indirectly through land use and human activities.

Physical expansion changes the composition of the landscape and can directly eliminate some life forms, or may eliminate or modify the conditions within a habitat that are necessary for the survival of a species. Urban expansion has also the effect of decreasing, fragmenting, and isolating natural habitats by altering their size, shape, and connectivity. Additionally, human activity within cities can have cascading effects that impact biodiversity, including changes in biogeochemistry, local temperature, climate change, and hydrologic systems. Urban development not only results in the destruction and/or fragmentation of habitats, it also accelerates the extinction of native species and influences invasion by non-native species. The consequences of urbanization on biodiversity and ecosystem services are difficult to generalize, as they will vary across different taxonomic groups, as well as the scale and intensity of urbanization. It has been seen that even though cities do support biodiversity (including native species), the process of urbanization profoundly affects the life cycles of various organisms. This often leads to a substantial decrease in native species diversity and populations. Though there is awareness about the threats of urbanization, a thorough understanding of the levels at which it has altered biodiversity on the global scale is lacking.

A recent study that incorporated data from across the globe identified 22 urban-related effects on protected areas, two-thirds of which are found to occur within 50 km of urban areas. The study suggested that along with the thousands of protected areas that are already impacted by urban expansion, many more might be added by 2030. Almost 90% of protected

areas likely to be impacted by future urbanization are in rapidly developing low- and moderate-income countries. Studies have shown that the greatest increase in the spread of urban land near protected areas will take place in developing countries and emerging economies, especially in the tropics. The world's 20 fastest-growing urban regions have been identified to be in Asia, South America, and Africa. It is hypothesized that urban growth in the coming decades will take place primarily in Asia (China and India in particular) and in Africa (especially Nigeria), in farmland, forests, savannas, and other ecosystems. Many Asian countries that are largely rural are undergoing massive shifts in population trends along with economic growth, resulting in a growing percentage living in urban areas. For example, the combined populations of Kolkata and Dhaka in the Ganges-Brahmaputra Delta increased from 4.9 million in 1950 to more than 30 million in 2010. With these growing population shifts, urbanization has become an unavoidable part of economic development, and prompts the need to identify, prioritize, conserve, and manage global key biodiversity sites in these countries.

In India, the Western Ghats, a global biodiversity hotspot, is a highly heterogeneous mountain range and extremely rich in biodiversity, especially in its endemic flora and fauna. This region is home to over 7,000 species of flowering plants, of which 38% are endemic to the range. It also harbours around 330 species of butterflies (11% endemic), 156 species of reptiles (62% endemic), 190 species of amphibians (75% endemic), 289 species of fishes (41% endemic), 508 species of birds (4% endemic), and 139 species of

mammals (12% endemic). This fragile ecosystem is one of the main sources of water for most of peninsular India. Even though the forests of this region have been fairly explored in the past, recent discoveries across taxa show that there may still be a lot of unknown species to be discovered.

Despite its high ecological importance, the Western Ghats is also one of the most populated biodiversity hotspots across the globe. The hill ranges are fragmented with villages, townships, and other settlements which are growing day by day, and there has been significant forest loss and degradation across different areas of the Western Ghats due to changes in land use pattern and deforestation. Fortunately, a majority of the pristine habitats in the Western Ghats have been identified as protected areas, primarily to conserve critical and threatened species. Additionally, the Ministry of Environment, Forest and Climate Change (MoEF&CC) has recently issued a notice demarcating 37% of the Ghats (about 57,000 sq. km) as Ecological Sensitive Areas (ESAs) based on a report submitted by the High-Level Working Group. However, despite these promulgations and legislations, the Western Ghats continues to face a serious threat to its existence.

Mumbai, the economic capital of India and also one of its most populated cities, is located along the western edge of the northern Western Ghats. The city can boast of a rich coastal habitat with mangroves to the west and the forests of the Western Ghats to the east. Sanjay Gandhi National Park, Tungreshwar Wildlife Sanctuary, and Kamala Bird Sanctuary, all pristine habitats for biodiversity, lie along the city of Mumbai. The Mumbai Metropolitan



Numerous birds like godwits, stilts, egrets, and various waders visit wetlands in urban areas.
It is important to identify and preserve these habitats in the wake of urbanization

Region Development Authority (MMRDA), the planning authority for Mumbai Metropolitan Region (MMR), has predicted in its 40-year concept plan that the city would have 44 million inhabitants by 2052, spread over 1,050 sq. km, which is almost double the present area of 603 sq. km. This means there will be tremendous pressure on the still existing natural habitats, especially mangroves and patches of natural forests, which will impact the biodiversity. Considering the coastal situation of the city, disappearance of the natural vegetation may not only leave the city vulnerable to local environmental issues such as floods, run off of pollutants, and reduction in ground water, but also global disasters such as cyclones, tsunamis, and sea level rise due to climate change. It is crucial to understand how changing land use patterns would impact the local biodiversity in MMR, in order to take up its conservation and management, thus

enabling it to keep this unique coastal ecosystem healthy and sustainable in the future.

Given Mumbai's background of an ecologically important and rapidly developing megacity, BNHS conducted a study to understand how urbanization affects different groups of organisms in a matrix of habitats within a rapidly developing landscape. Our study was designed primarily to predict the impact of urbanization on the biodiversity of the Mumbai landscape, and was focused in Kamala Bird Sanctuary, the habitats surrounding the Sanctuary, and the high elevation forests of Matheran and Prabalgad. Of these, Matheran is a popular tourist destination and has been identified as an ecologically sensitive area. Under the project, we studied the occupancy of various taxonomic groups from insects, reptiles, amphibians, birds, and mammals, to understand how each group reacts to habitat change in the landscape.

Land use and land cover analysis, carried out as part of the project, revealed that only a very small proportion of the study area now bears primary or less disturbed forest (semi-evergreen, moist deciduous, and mangrove forest). Around 25% of the area now has degraded forest (scrub and grassland), while the remaining area constitutes settlements and agriculture. The degraded forest is a direct consequence of clearing of the original moist-deciduous and semi-evergreen forests. Even though these disturbed forests have lost their original diversity and are in various stages of degradation, restoration measures need to be taken to increase the overall forest cover and to maintain the integrity and connectivity between the isolated primary forest patches in the landscape, so that they are not lost forever.

Based on the forest cover, we identified key links and associated forest corridors (which are larger



Leopard with a cattle kill captured using camera trap near Ransai village in Navi Mumbai. Conflicts like carnivores killing domestic animals often increase with increasing human population around forested habitats

than the links) that still connect key species-rich areas in this landscape. Restoration of these linkages will be crucial in maintaining the functionality of the corridors. The corridors are now mainly covered with a mosaic of primary and degraded forests, and they are generally situated on small hill ranges or offshoots of a large hill range. In addition to the preservation of key links, the functionality of corridors will depend on the restoration of degraded forests and conservation of primary forests in the corridors. In addition to the key links and corridors, we also identified key species-rich areas based on the predictions of the multispecies occupancy models.

Apart from the rich species diversity, the landscape also harbours many Threatened and Schedule species. Our study clearly suggests that a large number of species will be negatively impacted by the conversion of forest or degraded

forest into anthropogenic habitat cover (settlement and agriculture). All species of mammals and amphibians showed a negative impact from anthropogenic habitat cover on their occupancies. These were followed by reptiles and birds, while insects like butterflies were found to be less impacted by anthropogenic conversion. With regard to the aquatic part of the landscape, there appears to be significant movement of birds between the study sites, governed by tides and water conditions, which need to be factored into future management plans for the area. Judging by the pace of urbanization in this landscape and the future development plans of MMR, it is likely that a large number of species will become locally extinct, unless conservation actions are undertaken. Based on the findings of the study, we could provide clear-cut recommendations to MMRDA to undertake specific conservation plans in this landscape.

Given the current trend of urbanization and population increase in megacities like Mumbai, changes in natural habitats due to development will become inevitable. Studies like ours in the Mumbai area would help assess how each development project will impact the local biodiversity, and based on the findings, specific and more focused management plans for areas could be developed. It is critical to study and monitor the effects of major development activities on surrounding biodiversity before the commencement of such projects. Implementing long-term monitoring programmes that effectively inform conservation plans should be a top priority in environmental management. ■



Saunak Pal is 'Scientist B' at the BNHS. He is currently studying population trends of fauna for the biodiversity mapping and conservation projects of the Society.



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Ambassador of Monaco visits BNHS



The Ambassador of Monaco H.E. Mr. Patrick MEDECIN visited BNHS on October 10, 2017. Dr. Deepak Apte, Director, briefed him about the accomplishments and ongoing projects undertaken by BNHS. The Ambassador visited the Collection department where Mr. Rahul Khot exhibited a few specimens and explained the importance of preservation of specimens. ■

CMS COP 12: Manila, Philippines



Dr. Deepak Apte made an elaborate presentation on BNHS's role in vulture conservation in India

The Ministry of Environment, Forest and Climate Change, Government of India, BNHS, and BirdLife International jointly organized a side event in the CMS COP 12 held between 22nd and 28th October, 2017 in Manila, Philippines, to showcase the actions taken by

India which are envisaged in the Central Asian Flyway (CAF) Action Plan to conserve migratory waterbirds and their habitats, and other CMS agreements. INDIAN BIRD MIGRATION ATLAS, which is based on over 90 years ringing recovery data, satellite tracking, neck collaring, and colour flagging data available with the BNHS, was launched during this event. Migratory movements of 108 species are covered in the Atlas. Dr. S. Balachandran, Deputy Director, BNHS, made a presentation on Bird Migration Studies in India and flyway initiatives to the global audience. In another side event organized jointly by Govt. of India, State Govt. of Nagaland, and BirdLife International Asia, Dr. Deepak Apte, Director, BNHS, made an elaborate presentation on BNHS's role in vulture conservation in India. Mr. Soumitra Dasgupta, IFS, Inspector General of Forests (Wildlife) appreciated BNHS's efforts towards vulture conservation in India. ■

Second Phase of e-Mammal Project



Contributors and supporters of e-mammal Program at an exhibition organized as a part of the project

The e-Mammal Program is a citizen science project that uses camera traps to document animal population sizes, activity patterns, and habitat use. e-Mammal India seeks to promote conservation of mammals among children between the ages of 11 and 14 through the lens of applied scientific research. The second phase of the e-Mammal project is supported by ICICI Bank, while Sahyadri Nisarg Mitra, Chiplun, is coordinating it under the guidance of BNHS. BNHS is coordinating e-Mammal projects in 23 schools in Maharashtra, India. On 9th and 10th November 2017, Mr. Jaishigh Dhumal and Mr. Joachim Colaco, officials of ICICI Bank visited Kundalika High School, Patnus, Raigad, and New English School, Dapoli, Ratnagiri, under this project. Students from both schools reported on the progress of the project, organized an exhibition of animal paintings, and shared their experiences. ■

Sálim Ali Bird Count coordinated on a larger scale



Individuals and organizations participate in the annual bird count organized by BNHS in large numbers

In 2015, BNHS revived its pan-India Sálim Ali Bird Count which commemorates the birth anniversary of the 'Bird Man of India', the late Dr. Sálim Ali. The Count is conducted on the first Sunday after 12th November, both of which fortuitously happened to coincide this year, so the Count could be conducted on a larger scale. With its rising popularity, a number of IBCN partners and organizations have helped spread this Count to numerous locations. The Count was conducted in Mumbai, Karmala (Solapur), Aurangabad, Malegaon, Usmanabad, Jalgaon, Amravati, Ambejogai, Nashik, and Nagpur in Maharashtra, and in Gujarat and Tamil Nadu (Salem), besides other places. The enthusiastic response from birdwatchers and a steady flow of checklists are a positive sign for promising results from the Count. ■

CBMP Report presented in the Maharashtra Pakshimitra Sammelan



The 'Common Bird Monitoring Program' is a citizen science initiative of the BNHS



The 31st Maharashtra Pakshimitra Sammelan, organized by Here On Project Environment (HOPE) Nature Trust and Maharashtra Pakshimitra Sanghatana, was held at Ram Ganesh Gadkari Rangayatan, Thane, Maharashtra, on November 25–26, 2017. The theme this year was "Urban Birds: Their Lifestyles and Habits". Dr. Deepak Apte, Director, BNHS, delivered the Dr. Prakash Gole Memorial Lecture on 'Vulture Conservation in India'. He spoke on BNHS's work on conservation of vultures in India, using conservation breeding and advocacy as tools. The two-day event was

divided into five technical sessions conducted by experts. The Sammelan had a birdwatching session at Thane creek on the second day, along with discussion sessions.

At the Sammelan, BNHS shared the results of its 'Common Bird Monitoring Program' bird counts. Three seasonal counts were conducted during the year under this Citizen Science initiative, in which 101 grids were walked by participants throughout the country. A total of 51,095 individual birds belonging to 263 bird species were sighted and recorded through the counts. ■

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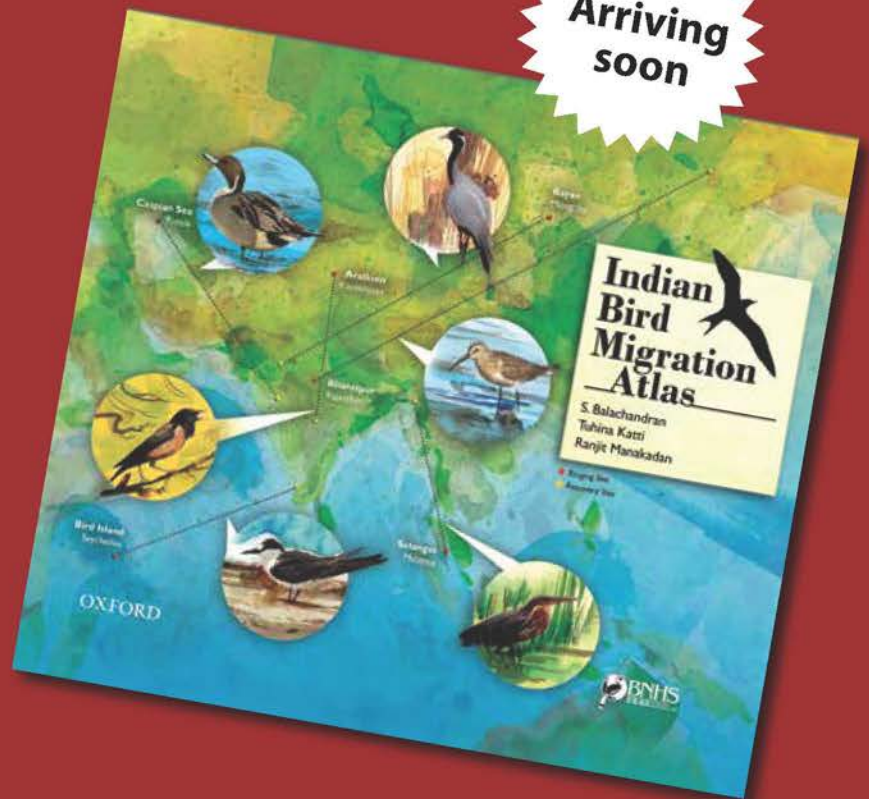
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