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The Sanctuary Wildlife Awards 2022

MEET DR. VIBHU PRAKASH

Lessons from Four Decades of Raptor Conservation

COP27: AN UPDATE

COP27 Commits to Loss & Damage, but Disappoints

HAIDERPUR

A Ganga River Paradise

Photo Credit: Dr. Anish Andheria

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TRISHALA ASHOK

Conservation filmmaker and science communicator, she has made several short films for wildlife NGOs and independent researchers to convey their stories. She is also a bodybuilding athlete and a former jewellery designer.

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SHAILENDRA YASHWANT

An independent photographer, writer and journalist, he is currently a senior advisor to the Climate Action Network South Asia and steering committee member of the Pesticide Action Network India.

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ROHAN BHATE (SHAH)

Honorary Wildlife Warden, Maharashtra Forest Department, Satara District, and member of the Governing Council of the BNHS, he has been a passionate voice for protecting the state's wildlife and wilderness areas.

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DR. Y. V. JHALA

Dean, Wildlife Institute of India and Lead Scientist, Cheetah Introduction Project, he did his post-doctoral research at the Smithsonian Institution. He has conducted research on Indian wolves, lions, tigers, golden jackals, striped hyenas, snow leopards, rhinoceros, and some ungulates.

Sanctuary Asia December 2022

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On the cover

Fearless and cheeky, this Black Drongo *Dicrurus macrocercus* made repeated attacks on the Short-toed Snake Eagle *Circaetus gallicus* at the Mhaismal Plateau in Maharashtra. Drongos are known to defend themselves from birds many times their size when threatened, to protect their territory and offspring. When this powerful raptor refused to budge, the attack was escalated – the smaller bird actually sat on the head of the larger, intent on its mission to chase it away. The fork-tailed passerine bird ultimately forced it to abandon its perch.

Photographer: Anand Patil

Bittu Sahgal,
Editor, Sanctuary Asia

The Deer and the Tiger

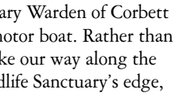
In March 2011, the legendary Dr. George Schaller, Dr. Alan Rabinowitz of *Panthera*, Brijendra Singh, Honorary Warden of Corbett Tiger Reserve and I clambered aboard a small motor boat. Rather than take the Ramnagar road, we had decided to make our way along the Kalagarh Dam Reservoir and the Sonanadi Wildlife Sanctuary's edge, to Dhikala in the core of the Corbett Tiger Reserve.

Above the sound of the engine, Brij and I spoke to both carnivore experts about how tough it was to keep India's wildlife safe when budget allocations fell short of what our poorly equipped protection staff needed. Suddenly, all conversation hushed as Brij pointed to our left, asked the boatman to cut the engine and allow the boat to silently drift closer to shore. There, before us, at the fringes of the forest, stood a handsome male tiger, watching us curiously from a distance of roughly 60 m. It was a magical moment that reminded us why we chose to spend our lives with and for the wild.

Lost in thought, none of us felt much like speaking until we reached Dhikala, when we finally allowed ourselves to marvel at what we had just witnessed. Over lunch, the conversation hovered around the future of Project Tiger. Both Schaller and Rabinowitz applauded India for saving the tiger against all odds, yet expressed concern for its future. In the latter's words: "Without functional corridors to link the isolated forest parcels into which the large cats have retreated, local extinction could take place at the hands of poachers." Dr. Schaller added that as habitats *outside* protected tiger reserves continue to vanish or be degraded, dispersing tigers were at risk from retribution killing. His research in the 1960s in the Kanha Tiger Reserve (where Parth Kansara captured the exquisite chital deer ballet you see on this page) resulted in the iconic book *The Deer and the Tiger* in which Schaller wrote: "The carrying capacity of many forest areas and other uncultivated lands is so far exceeded by livestock alone that a substantial amount of wildlife could not support itself even if it were protected from shooting."

Being out in the wild with those who understood how 'the system' works was pure therapy. I work with children and tell them, "When the Earth is deforested, it conspires to reforest itself. When it is poisoned, it conspires to detoxify itself. When its drainages are blocked, it unclogs itself. When overheated, it cools itself. It's a magic machine. If you or I owned a self-repairing toy that looked half as good, we would take better care of it and value it more than we do the fragile blue planet we call home."

And the children agree!



PHOTOGRAPHER: Parth Kansara
LOCATION: Kanha Tiger Reserve, Madhya Pradesh
DETAILS: Camera: Nikon D500, Lens: Nikon 70 - 300 mm. f4.5-6.3, Aperture: F/6.3, Shutter speed: 1/1000 sec., ISO: 320, Focal length: 90 mm.
DATE: October 16, 2021, 7:09 a.m.

WORLD SCAN

TIGER SHARKS HELP DISCOVER WORLD'S LARGEST SEAGRASS FOREST

Seagrass meadows, being difficult to study, are quite under-researched. They are not easily visible by planes or satellites, and are sometimes entwined with other plants, which is why they need to be studied at their site itself. But human access is a tricky, slow and expensive process.

In order to measure and study seagrass meadows in the Bahamas, researchers fixed cameras and trackers to the dorsal fins of tiger sharks and later collected data from the several hours they spent swimming across the ocean floor. They were chosen for their high mobility, ability to swim to great depths, and spend considerable amounts of time in seagrass meadows. What they discovered from this data was 92,000 sq. km. of seagrass meadows – which researchers say is the world's largest seagrass forest. This discovery increases the world's known seagrass coverage by more than 40 per cent.

DIGITAL PLATFORM GREEN FINS HUB LAUNCHED BY UNEP

The United Nations Environmental Programme (UNEP) and Reef-World Foundation recently launched the Green Fins Hub, a global digital platform for snorkelling operators worldwide. Green Fins Hub will host two types of membership. One would be a digital membership available for diving, snorkelling and live-aboard operators globally, where they can receive environmental scores based on detailed online self-assessment and tracking of progress made on their goals.

One interesting feature of the platform is the Green Fins Community Forum, for operators to discuss industry

PUBIC DOMAIN/ALBERT KOK

Researchers fixed cameras and trackers on the dorsal fins of tiger sharks and discovered 92,000 sq. km. of seagrass meadows in the Bahamas – the world's largest seagrass forest.

requirements, environmental issues and share learnings and ideas with others working in the marine tourism and conservation space. In a recent survey of over 2,400 dive tourists and professionals by the Reef-World Foundation, 83 per cent said they were looking for more sustainability education while travelling. Around 75 per cent said they would pay more for it, while 85 per cent said they found it tough to gauge whether an operator was sustainable.

OPEC OF RAINFORESTS

Brazil, Indonesia and the Democratic Republic of the Congo – home to the Amazon, Congo basin and Borneo and Sumatra rainforests – have been in talks over forming an alliance to cooperate and coordinate the conservation of their tropical rainforests, which form 52 per cent of the world's primary tropical rainforest cover and are threatened by commercial logging, mining and illegal exploitation. The recent election of Luiz Inácio Lula da Silva in Brazil has also bolstered efforts to halt the destruction of the Amazon, as one of his campaign pledges was to fight for zero deforestation in the Amazon.

The alliance (see page 46) between the three countries could lead to future joint proposals on carbon markets and finance, in a bid to motivate developed countries to finance the conservation of these vital ecosystems. At COP26 in Glasgow last year, the three countries signed an agreement to stop and reverse deforestation by 2030.

FINANCIAL INSTITUTIONS CONTINUE FUNDING DEFORESTATION

A report published by the organisation Forests and Finance Coalition reveals that between 2020 and 2021, the world's largest financial institutions have only amped up their support for companies responsible for deforestation. Finance for these businesses increased by 60 per cent within that year. Indonesia's pulp and paper sector and Brazil's beef industries are the biggest drivers of deforestation.

Around 200 major banks and investors were assessed and according to the findings, almost all were not adequately managed and had mitigated their environmental, social and governance risks (ESGs). The report also revealed that since the 2015 Paris Agreement, banks have poured 267 billion USD into forest-risk commodity companies and, as of September 2022, investors held 40 billion USD bonds and shares in the same.

INDIA SCAN

MINING HALT IN MADHAV NATIONAL PARK'S ESZ

On September 21, 2022, the National Green Tribunal (NGT) called for a halt to mining activity in the ecologically sensitive zone (ESZ) of the Madhav National Park, Shivpuri, Madhya Pradesh. Annexure II of the ESZ notification includes a list of villages falling within the ESZ and Majhera, a village. This is where 25 families of the *Sahariya* tribe – a particularly vulnerable tribal group, live just one kilometre from the mining area. This tribe has been particularly prone to the destructive effects of mining. The petitioner, Abhay Jain, highlighted that advertisements by Shivpuri's district mining department had been released for leasing out mining sites that are within a two kilometre range from the ESZ of Madhav National Park. The NGT warned that mining had previously been undertaken at the sites and that there was still uncleared overburden (the rock or soil layer that needs to be removed in order to access the ore being mined) in the area.

GUN BAN TO PROTECT AMUR FALCONS

Amur Falcons, the world's longest-flying migratory raptors, travel from their breeding grounds in eastern Asia to their wintering grounds in southern Africa, covering a distance of around 20,000 km. They break for a few weeks in Northeast India, in the states of Manipur, Assam and Nagaland, from the second week of October onwards – their arrival in flocks of thousands creating a dark, majestic spectacle in the sky. Though protected under the *Wild Life (Protection) Act*, 1972, for years they were hunted in large numbers by locals, who would use huge fishing nets hung across trees to trap them, or guns to shoot them down. In 2012, the NGO Conservation India reported that roughly 12,000 of these small raptors were being hunted every day at the peak of their migration to India. Officials in Northeast India have recently banned the use of guns and airguns, while also confiscating catapults and nets. In addition to these protective measures, forest officers also patrol the areas frequented by the birds, making sure that they are not disturbed as they recover, rest and feast in preparation for the long journey ahead.

PUBLIC DOMAIN/SUMEET MOGHE

Amur Falcons are migratory raptors that take a break in Northeast India, where guns have recently been banned.

PUBLIC DOMAIN/ANANTH T.

The National Green Tribunal (NGT) warned that unauthorised mining in the ecologically sensitive zone of the Madhav National Park is impacting wildlife and locals.

SUJIT PATWARDHAN PASSES AWAY

PUBLIC DOMAIN/SUJIT PATWARDHAN

Sujit Patwardhan's visionary legacy includes his vocal opposition to ecosystem destruction in Pune.

Sujit Patwardhan, longtime friend of Sanctuary, environmentalist, public transport expert and champion of sustainable urban planning from Pune, passed away on October 22, 2022 after a brief illness. He was 77 years old. Patwardhan founded 'Parisar' in the 1980s, a civil society organisation focused on lobbying and advocacy for sustainable development and nature conservation in Pune. The initiative was borne out of a grave concern for the rapid environmental degradation in Pune in the name of urban development.

During its early years, Parisar held lectures by celebrated thinkers such as Vandana Shiva, Medha Patkar, Ramchandra Guha, Madhav Gadgil and Sanctuary's own, Bittu Sahgal. Sujit's visionary legacy includes his vocal opposition to road widening, flyovers and ecosystem destruction in Pune; his inputs for Pune's first Comprehensive Traffic and Transport Policy; and his insight on how transport policies were linked directly to air pollution, road safety and heritage conservation.

NEW SPECIES OF HONEYBEE DISCOVERED

After more than 200 years, a new species of honeybee has been discovered in India. Endemic to the Western Ghats, the newly-discovered Indian black honey bee *Apis karinjodian* was discovered by scientists Shanas S. from the Kerala Agricultural University's Integrated Farming Systems Research Station, Karamana; Anju Krishnan G., a Ph.D. research scholar from the Zoology department of S.N. College, Cherthala (affiliated to the University of Kerala); and Mashhoor K. from the EMEA College of Arts and Science, Malappuram. This newly discovered honeybee is found in the central Western Ghats and Nilgiris, all the way to the southern Western Ghats – in Goa, Karnataka, Kerala and parts of Tamil Nadu. It has been classified as near threatened (NT) according to the IUCN Red List.

CLIMATE WATCH

EARTH IN 'CODE RED' STATE

Three decades after 'Warning to Humanity' was released in 1992, an international team of scientists have released a third report that states that "humanity is unequivocally facing a climate emergency." The report also illustrates how 16 of the 35 vital signs studied by the authors to measure climate change are now at record extreme levels. It also mentions that in 2022, the levels of atmospheric carbon dioxide have reached peaks not reached for millions of years. "The scale of untold human suffering, already immense, is rapidly growing with the escalating number of climate-related disasters. Therefore, we urge scientists, citizens, and world leaders to read this special report, and quickly take the necessary actions to avoid the worst effects of climate change," the report warns.

INDIA'S SOLAR POWERED VILLAGE

Modhera in Gujarat recently became India's first fully solar powered village. More than 1,300 rooftop solar panels have been installed on residential and government buildings, which will supply residents with electricity at no cost. In fact, the government buys excess energy produced if villagers do not use the entirety of their allocated capacity. Around 3,900 crore rupees have been spent on the project thus far. India, the world's third-largest emitter of carbon dioxide, has pledged to meet half of its energy needs from renewables such as solar and wind energy by 2030. UN chief Antonio Guterres, on his visit to Modhera, said that on account of this solar energy project, the village was "more healthy, giving more prosperity, but at the same time contributing to rescue our planet from climate change that is still rising without control," and added that Modhera was setting an example of "reconciliation between humankind and the planet".

PUBLIC DOMAIN/PRASHANTH VISHWANATHAN

Modhera in Gujarat is India's first fully solar-powered village. The government of India has pledged to meet half its energy needs from renewables by 2030.

DHRITIMAN MUKHERJEE

Mangrove cover in the southern states of India could be severely affected by rising seas and submerging coastlines.

HALF OF INDIA'S MANGROVES COULD DISAPPEAR BY 2070

A recently published study conducted by the Birbal Sahni Institute Paleosciences (BSIP) revealed that mangroves – our primary coastal buffer against sea level rise, soil erosion and natural disasters – have significantly reduced on account of climate change. By 2070, they are expected to reduce by 50 per cent, especially along the southern Indian coast. The mangrove cover in Karnataka, Tamil Nadu, Andhra Pradesh and Kerala will be most severely affected by a submerging coastline. For the study, the researchers considered two of the most dominant mangrove species in India, *Rhizophora mucronata* and *Avicennia officinalis*, and then projected and mapped their distribution across the coastline in past, present and future climate change scenarios. They then compared the findings against present data on mangroves collected during field surveys in mangrove-forested areas.

INSURERS BACK AWAY FROM FOSSIL FUEL PROJECTS

'Insure Our Future', an alliance of several groups that tracks policies taken on activities that contribute heavily to global heating, have announced that many insurers are withdrawing from oil, gas and coal projects. According to the alliance, 62 per cent of reinsurance companies – which aid other insurers in spreading their risks – are planning to quit covering coal projects, while 38 per cent are also excluding some oil and natural gas projects.

Part of the reason for this shift has to do with investor demand. But insurers are also starting to make the connection between fossil fuels and the impact of greenhouse gas emissions on their business. In October 2022, Munich Re, one of the world's biggest reinsurers, issued a statement saying it would stop backing new oil and gas fields beginning April 2023.

PUBLIC DOMAIN

Businesses are increasingly recognising the impact of fossil fuel projects.

ANAND PATIL

1st Prize

First Prize: Anirban Dutta *In a Fell Swoop*

LOCATION: Cooch Behar, West Bengal
DETAILS: Camera: Nikon D500, Lens: Nikkor 200-500 F/5.6, Shutter speed: 1/5 sec., ISO: 800, Aperture: f/32, Focal length: 500 mm.
DATE: March 31, 2022, 6:09 p.m.

The Sanctuary **Wildlife** Photography Awards 2022

CALL OF THE WILD

In the dance of survival, battles ensue between species of varying strengths – clever drongos and winged termites, magnificent eagles and audacious jackals, powerful tigers and swift monkeys, and humans with so many wild animals such as leopards, elephants and bears. Then there's also the breathtaking beauty of the natural world, existing nonchalantly, yet magically – confoundingly camouflaged insects, swarming termites, and mystically swirling fungus spores. To witness these tussles and gorgeousness is awe-inspiring in itself, but to capture it on camera and portray the moment for audiences sitting thousands of miles away is a true feat. This year's winners of the Sanctuary Wildlife Photography Awards are just that – a feat of technology, a keen eye, and the marvellous natural world.

2nd Prize

Second Prize: Abhijit Somvanshi *Battle of Wills*

LOCATION: Pench Tiger Reserve, Madhya Pradesh
DETAILS: Camera: Nikon D3300, Lens: Nikkor 200–500 mm. f5.6, Shutter speed: 1/1000 sec., ISO: 400, Aperture: f/5.6, Focal length: 220 mm.
DATE: May 17, 2022, 7:23 a.m.

Third Prize: Anand Bora *A Messy Conflict*

LOCATION: Nashik, Maharashtra
DETAILS: Camera: Nikon D750, Lens: Nikon 24-120 mm., Shutter speed: 1/640 sec., ISO: 6400, Aperture: f/6.3, Focal length: 105 mm.
DATE: January 25, 2019, 10:13 a.m.

Certificate of Merit

1

Angad Achappa *Woody Wonders*

LOCATION: Amboli, Maharashtra
DETAILS: Camera: Nikon Z7, Lens: Nikkor Z MC 105 mm. F/2.8 VR S macro, Shutter speed: 1/160 sec., ISO: 640, Aperture: f/13, Focal length: 105 mm.
DATE: July 31, 2022, 10:02 a.m.

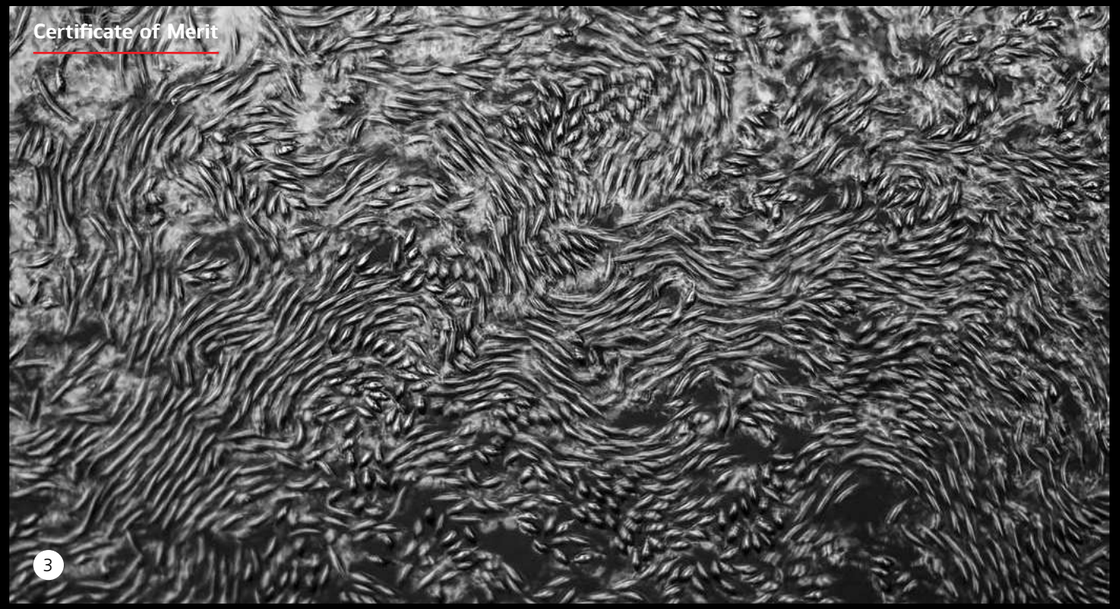
Certificate of Merit

2

Amith Kiran Menezes *Dwelling in Permanence*

LOCATION: Bengaluru, Karnataka
DETAILS: Camera: Canon EOS 90 D, Lens: Canon 100 mm. macro, Shutter speed: 1/125 sec., ISO: 200, Aperture: f/14, Focal length: 100 mm.
DATE: January 4, 2021, 12:44 p.m.

Certificate of Merit



3

Vijay Parmar *Whirling Whirligigs*

LOCATION: Purna river, Gujarat
DETAILS: Camera: Canon EOS 700D, Lens: Canon EOS 50 mm., Shutter speed: 1/60 sec., ISO: 100, Aperture: f/1.8, Focal length: 50 mm.
DATE: February 28, 2022, 9:53 a.m.

Certificate of Merit

4

Dr. Lalith Ekanayake *Outrunning a Rampage*

LOCATION: Yala National Park, Sri Lanka
DETAILS: Camera: Nikon D5, Lens: Nikon 70-200 mm./f2.8, Shutter speed: 1/640 sec., ISO: 64, Aperture: f/4, Focal length: 200 mm.
DATE: December 2, 2017, 11:52 a.m.

Honourable Mention

5

Anirban Dutta *Mite-y Colourful*

LOCATION: Cooch Behar, West Bengal
DETAILS: Camera: Nikon D500, Lens: Tamron 90 mm. VC USD, Shutter speed: 1/100 sec., ISO: 320, Aperture: f/18, Focal length: 90 mm.
DATE: October 13, 2021, 9:51 a.m.

Honourable Mention

6

Chaithanya Krishnan *Clear and Present Danger*

LOCATION: Bandhavgarh National Park, Madhya Pradesh
DETAILS: Camera: Nikon D500, Lens: Sigma 150-600 mm., Shutter speed: 1/320 sec., ISO: 400, Aperture: f/9, Focal length: 270 mm.
DATE: June 4, 2022, 4:43 p.m.

Honourable Mention

7

Riaz Cader *Breaking Bad*

LOCATION: Minneriya National Park, Sri Lanka
DETAILS: Camera: Canon 5D Mk III, Lens: Canon 400 mm. f/2.8 IS II, Shutter speed: 1/200 sec., ISO: 1000, Aperture: f/4, Focal length: 400 mm.
DATE: August 15, 2022, 4:30 p.m.

Honourable Mention

8

Chandrasekar Das *Mount Debris*

LOCATION: Kotagiri, Tamil Nadu
DETAILS: Camera: Canon EOS 7D Mark2, Lens: Canon EF 100-400 f/4.5, Shutter speed: 1/800 sec., ISO: 800, Aperture: f/6.3, Focal length: 400 mm.
DATE: August 13, 2022, 4:01 p.m.

Honourable Mention

9

Kenneth Lawrence *Eyeing Death*

LOCATION: Sasan Gir, Gujarat
DETAILS: Camera: Canon 5D Mark IV, Lens: EF 16-35 mm. f/2.8L II USM, Shutter speed: 1/160 sec., ISO: 100, Aperture: f4, Focal length: 19 mm.
DATE: April 10, 2022, 7:21 a.m.

Certificate of Merit

Prathamesh Ghadekar *Magic in Macro*

The suspended particles of 'space dust' in the background are actually spores, released in liberal quantities by the fungus covering the Log (see page 62). Prathamesh Ghadekar observed snails (*Succinea sps.*) on the log, feasting on the fungus in Shahpur, Thane and was fascinated by the vibrant colours that appeared when he shone a flashlight onto the spores. Firing an intense flash from the opposite side, he succeeded in showcasing how small natural history moments in our backyard can be as stunning as scenes from far-flung galaxies!

LOCATION: Shahpur, Thane
DETAILS: Camera: Canon EOS 5D Mark III, Lens: Canon 100 mm. f/2.8 macro, Shutter speed: 1/100 sec., ISO: 500, Aperture: f/32, Focal length: 100 mm.
DATE: August 25, 2021, 12:37 a.m.

Editor's Choice

Mayuresh Kishor Hendre *Table for Two*

Two sleek, beautifully spotted, small Indian civets *Viverricula indica* are frozen in this camera trap image from Jamoon village on the outskirts of the Corbett Tiger Reserve, Uttarakhand. The photographer set up a hidden camera trap hoping for images of a tiger returning to feed on the decaying carcass of a sambar *Rusa unicolor* (see page 54). Three days later he found that two small Indian civets had opportunistically scavenged the remains of the day!

LOCATION: Corbett Tiger Reserve, Uttarakhand
DETAILS: Camera: Nikon D810, Lens: Samyang 14 mm. f/2.8, Shutter speed: 1/250 sec., ISO: 800, Aperture: f/13, Focal length: 14 mm.
DATE: February 11, 2022, 7:27 p.m.

The Sanctuary Wildlife Photography Awards 2022

FIRST PRIZE: In a Fell Swoop: A swarm of termites dips around a street lamp as an agile Black Drongo *Dicrurus macrocercus* swoops in to pick morsels from the insect cloud. This dream-like image masks the chaos of its setting – a busy petrol pump. The photographer merged three images using in-camera multiple exposures, but the image was created in his mind before it was captured. For his creative skills and evocative imagery, Anirban Dutta was unanimously selected as the Sanctuary Photographer of the Year 2022.

SECOND PRIZE: Battle of Wills: Two carnivores face off in the dry, grassy habitat of the Pench Tiger Reserve in high summer – a pair of Indian jackals *Canis aureus indicus* and a Changeable Hawk Eagle *Nisaetus cirrhatus*. The eagle accepted the interlopers' challenge, attacking and locking one of the jackals in a fierce fight while the other quietly began eating. Eventually, the tussle ended mutually, with them accepting each others' presence as they shared the meal. For capturing this stunning moment in the high-octane drama of survival between two species, Abhijit Somvanshi was awarded the second prize.

THIRD PRIZE: A Messy Conflict: This image from Nashik captures a desperate cat wanting to do little more than get away from its tormentors. A local political leader jumped into the fray in a badly calculated attempt to catch the cat. Though injured, he escaped with his life. As did the leopard that was safely trapped and released by forest officials. Anand Bora was awarded a prize for his visual documentation of a dramatic conflict that mercifully ended well for men and animal.

Certificate of Merit

1. Woody Wonders An amorous pair of *Xylorhiza adusta* beetles belonging to the Family Cerambycidae, look indistinguishable from a bit of dry wood and would have gone unnoticed if the photographer had not been accompanied by his entomologist guide. On closer inspection the photographer discovered the tiny, beady black eyes, long antennae and a pair of legs, clinging steadfastly to a real woody twig. The image drew our judges' attention for its unique focus on camouflage as a survival strategy.

2. Dwelling in Permanence Bagworm moth larvae build intricate dwellings in which to pupate, using twigs, dry leaves and other plant and animal debris. These miniature architectural marvels are meticulously stacked in durable formations. In this case, the larva also included jade-like plastic bits stacked in a jenga-like pile – an uncomfortable reminder of how plastic has become an unwelcome part of the life cycle of virtually every living being. To their horror, scientists recently discovered microplastics in human breast milk.

3. Whirling Whirligigs Out on a morning sojourn with a friend on the banks of Purna river in Gujarat, the photographer stumbled across a mass of silvery-grey water beetles swimming furiously on the water surface. Whirligig beetles swim in rapid circles without bumping into their neighbours, almost like dancing dervishes! Although they prefer moving on the water's surface, whirligig beetles of the family Gyrinidae can also dive underwater when under threat *and* even take to the skies in search of mates. Vijay Parmar obtained this beautifully composed monochrome Van Gogh-like image using a top angle and slow shutter to freeze the swim trails and ripples created by the quick movements of the beetles.

4. Outrunning a Rampage In the Yala National Park, Sri Lanka, a safari vehicle came a little too close for comfort to an angry Asian elephant *Elephas maximus*. A Park Ranger, seated in another vehicle bravely decided to help and succeeded in diverting the giant mammal's attention away from the jeep... but to himself! With four muscular tonnes of fury charging at top speed, the ranger found himself running for his life! This nerve-wracking moment was captured seconds before the ranger successfully clambered into his vehicle to give the story a happy ending.

Honourable Mention

5. Mite-y Colourful Sheer and diaphanous, the many layers of a web stretch across the frame studded with tiny red spider mites. The gauzy web is designed as protection from predators. Anirban Dutta took multiple in-camera exposures for this dramatic, brilliantly lit and vibrant image, that required considerable preparation, thought and patience as he chose to illuminate the scene with two external flashes from opposite angles. The red hues were created using coloured cellophane paper to mask the flashes.

6. Clear and Present Danger The photographer was left awestruck by this fast paced, exciting chase near a waterhole in the Bandhavgarh Tiger Reserve, Madhya Pradesh. Unaware of the awaiting danger, a grey langur *Semnopithecus entellus* approached the waterhole, only to be chased and caught by a young tiger cub. The intensity and focus in the tiger's eyes juxtaposed against the langur's desperation to get away... captured an ancient rhythm of life.

7. Breaking Bad The pathos on the face of this wild Asian elephant *Elephas maximus* was effectively captured as it stretched its foot and, in one swipe, attempted to cross a live electric fence to get to a dumpster near the Minneriya National Park in Sri Lanka. While this pachyderm was successful in reaching the nearby dirt road where he waited for the rest of his companions, the image is a stark reminder of how illegal electric fences, installed by equally hapless farmers trying to save their crops, pose a fatal threat to wild animals seeking sustenance outside their increasingly shrinking forest homes.

8. Mount Debris In the outskirts of Kotagiri, Tamil Nadu, a sloth bear *Melursus ursinus*, ambled from its forest habitat towards the town's dump yard. Chandrasekar Das captured the bear as it climbed the mountain of trash in search of leftovers, dwarfed by the sheer magnitude of *Homo stupidus*' consumerist addiction. As more and more small towns become urbanised, our trash problems increase exponentially, putting wildlife and ourselves at unimaginable risk.

9. Eyeing Death A rusty-spotted cat *Prionailurus rubiginosus* that attempted to navigate an oncoming minefield of traffic paid with its life. These near-threatened felines, among the smallest wild cats are barely half the size of domestic cats! The photographer was saddened that his first encounter with this beautiful cat was not in the wild, but after its death on the busy Sasan-Talala highway just off the Gir National Park. The killer road was reportedly built without the approval of the Gujarat State Wildlife Board.

COURTESY VIBHU PRAKASH

THE SANCTUARY WILDLIFE AWARDS 2022

Celebrating our Green Army

Sponsored by DSP Investments Pvt. Ltd. **Co-sponsored by** Godrej Industries Ltd. and Morningstar India,
CSR Partners IndusInd Bank, HT Parekh Foundation and Bajaj Electricals Foundation
Associates Wildlife Conservation Trust and CarbonCopy

The *Sanctuary Wildlife Service* Awards honour eight men and women, from across India, who have unhesitatingly and bravely shouldered the burden of nurturing and protecting wild India. Their commitment and steadfastness to nature conservation show us how the monumental task of protecting our natural resources lies with each one of us. While their service contributions are impossible to justly chronicle, we present some of their inspirational stories. These are the heroes whose steps we hope many more will follow.

LIFETIME SERVICE AWARD

Protectors of wild habitats who have been in action for decades, inspiring millions, sparking movements, unearthing natural history knowledge, building conservation strategies, and shaping communities…

DR. VIBHU PRAKASH

Scientist, conservationist and species protector

Dr. Vibhu Prakash's (also see page 36) name is synonymous with vulture conservation in India. Stories from his childhood and youth contain some clues to his remarkable, 40-year journey of studying and conserving raptors in the country. A shy boy in Meerut who preferred the company of the plants and animals he encountered on his solo adventures outdoors, he was always encouraged by his mother to read books and articles on nature and was particularly influenced by the writings of Jim Corbett.

While he was a graduate student in the 1970s, he enjoyed birding along the Abu *Nallah*, a large drain that flowed through Meerut city. One day, he spotted a huge flock of European Starlings and, unable to identify them, he bought *The Book of Indian Birds* by Dr. Sálim Ali, but he didn't find the birds within those pages either. Puzzled, he wrote to the celebrated ornithologist and was pleasantly surprised to receive a response. That was the beginning of his correspondence with the iconic Indian naturalist. After graduation, he decided to apply to the Bombay Natural History Society and got the job. His first posting at Point Calimere, Tamil Nadu, laid the foundation for his lifelong interest in raptors.

In the early 80s, he began working on his Ph.D. at the Keoladeo Ghana National Park, Bharatpur, Rajasthan, meticulously observing various species of raptors and recording their population changes and nesting performance over the years. He was awarded a Ph.D. degree by Mumbai University in 1990. In the early 90s, Dr. Vibhu Prakash and his team continued gathering data on vulture populations across national parks. If not for their constant monitoring, the sharp decline in numbers would have gone unnoticed. Racing against the clock, he and his colleagues initiated the vulture recovery programme, which became the guiding force for the Indian government's response to the situation. He was involved in setting up the internationally acclaimed Vulture Conservation Breeding Programme with centres in Pinjore (Haryana), Buxa (West Bengal), Rani (Assam) and in Bhopal (Madhya Pradesh). Today, these centres manage more than 800 vultures. Additionally, 344 hatchlings have been successfully reared. This has been primarily instrumental in the recovery of three *Gyps* vulture species – the White-backed *G. bengalensis*, Long-billed *G. indicus* and Slender-billed *G. tenuirostris*.

Dr. Prakash played an instrumental role in the banning of veterinary use of diclofenac – the drug that caused the decline in vultures. With over four decades of raptor studies and vulture conservation behind him, he continues his vital work in the field. Today he is a Ph.D. guide for students at the Mumbai University. His wife Nikita works shoulder to shoulder with him at Conservation Breeding Centres and his two sons, Rishabh and Saurabh, though engineers by profession, are very keen on raptors too.

Dr. Prakash has been the Deputy Director and Principal Scientist of the Bombay Natural History Society since June 1995. He serves on various national and international committees, organisations and groups regarding the protection of raptors in general and vultures in particular. Besides which, he has also been extensively featured in various renowned media platforms.

Dr. Prakash is a national treasure, as valuable to conservation science as our raptors are to our ecosystems. For his life's work of pioneering scientific research and timely, incisive conservation efforts to protect our vultures, we honour him.

COURTESY VIBHU PRAKASH

COURTESY VIBHU PRAKASH

ABOVE *Dr. Vibhu Prakash climbs up to the nest of a White-backed Vulture* G. bengalensis *to remove its first clutch egg for artificial incubation and thus encourage the pair to lay more eggs. His efforts have helped secure the species' population in India.*

TOP *Dr. Prakash addressing young trainees at a centre set up under the Vulture Conservation Breeding Programme.*

FACING PAGE *Dr. Prakash notes morphometrics of a Red-headed Vulture* Sarcogyps calvus. *He has four decades of raptor studies and vulture conservation behind him.*

Rituraj Phukan is a fearless and vocal advocate for climate change action and environment protection.

WILDLIFE SERVICE AWARDS

Inspired wildlifers, forest employees, researchers, villagers… anyone currently involved with nature conservation and the battle to protect our biosphere. Sanctuary searched for true heroes who display extraordinary courage, dedication and determination and set high personal standards for others to follow…

RITURAJ PHUKAN

Climate warrior, wildlife protector and adventurer

Robert Swan, the first man to have walked to both the North and South poles, made a crucial observation: The greatest threat to our planet is the belief that someone else will save it. Rituraj Phukan, who was invited for an expedition to Antarctica by Swan himself, and later accompanied him to the North polar region too, certainly does not hold this belief, and has been working tirelessly for the planet.

The extreme environment of Antarctica was the beginning of Rituraj's own journey as a climate activist. From the polar frontiers of the Arctic and Antarctic, to the peaks and valleys of the Himalaya, and all across India, Rituraj had been observing the cascading impacts of climate change. There was no way he could be a silent witness. He quit his government job, and became a staunch, vocal advocate for the environment, and has been working as a climate activist since then. Rituraj wears multiple hats to drive forward awareness about the climate crisis. He is the Founder of the Indigenous People's Climate Justice Forum, and Secretary of the Forest Man Foundation. He is a member of the International Union for Conservation of Nature, and sits on the board of civil society groups in the Americas, Europe and Australia, and a European Climate Pact Ambassador. He is the Chief Operating Officer for Walk for Water, the National Coordinator for Biodiversity, Climate Reality Project India and Secretary General of Green Guard Nature Organisation.

The global impact of climate change requires urgent global action and collaborations. Rituraj works with grassroots communities, students, businesses, legislators, bureaucracy, civil society and the media to create positive change. He was trained as a Climate Reality Leader by Nobel Laureate Al Gore and was featured in the former US Vice-President's 2017 book *An Inconvenient Sequel: Truth to Power.*

Rituraj is a regular op-ed contributor on the climate and biodiversity crises for *The Assam Tribune,* and in publications across the world including the *American Journal of Economies and Sociology, Earth Journalism Network, The Manila Times*, *Sanctuary Asia* and *Sanctuary Cub*, *Christian Science Monitor, Igniting Minds*, and more!

Through his untiring speaking and teaching engagements in over a hundred educational institutes and at international fora, Rituraj focuses on warming, water and wildlife. He believes that "Water is the local issue of global climate change, for people and for biodiversity".

A long-term vegan, Rituraj practices what he preaches and advocates that all of us begin by practising one positive way to reduce our negative impact on the planet. "If a lot of us do even a little, a lot gets done," he says.

COURTESY RAMANA ATHREYA

COURTESY RAMANA ATHREYA

ABOVE LEFT *Rituraj Phukan conducts a nature trail for students in Guwahati, Assam. Through his speaking and teaching engagements, he focuses on warming, water and wildlife.*

ABOVE RIGHT *Rituraj has travelled to Antarctica as well as the North Pole, expeditions that lead to his own journey as a climate activist.*

RAMANA ATHREYA

Ecologist, conservationist and astrophysicist

As an astrophysicist, peering at the sky to unravel the universe's mystery is second nature for Ramana Athreya. His profession melded seamlessly with his vocation – the study of bird life, and the related fields of ecology and conservation. One of his most important contributions to our knowledge of avians was the description of a new bird species – the *Bugun liocichla* – in Arunachal Pradesh in 2006. The discovery is a feather in the cap for India too as it was the first bird discovered since India's Independence! The striking, multi-coloured bird is seen in select pockets of the Eaglenest Wildlife Sanctuary and Singchung Bugun Village Community Reserve (SBVCR), where Ramana works. Its conservation is of paramount importance as it has been classified as critically endangered.

In an effort to conserve the *Bugun liocichla* and its habitat, Ramana has been mentoring the *Bugun* tribal community. He believes wilderness conservation will succeed only if the needs and concerns of the local community are part of the solution. The community is a key player for the SBVCR, which won the India Biodiversity Award 2018 for its efforts to protect the *Bugun liocichla*. Ramana also received the Whitley Award in 2011 for his community wildlife conservation work.

Fittingly, on the occasion of the 11th Conference of Parties to the Convention on Biological Diversity conducted in Hyderabad in 2012, the Indian Postal Department released a commemorative stamp with *Bugun liocichla* to highlight the need to protect our biodiversity. Ramana is a Trustee and Coordinator of Biodiversity Research & Conservation EcoSystems-India, Guwahati. He has also been an Associate Professor of Physics and Biology at the Indian Institute of Science Education and Research (IISER) Pune since 2009. Ramana and his Ph.D. students engage in ecology and astronomy research in his molecular-ecology lab. He is a vital bridge between academia and on-the-ground conservation in Arunachal Pradesh. Ramana works hard to untangle the complexities of biodiversity conservation and community sustenance and is regularly invited to speak at national symposiums, conferences, and different universities in India. Deeply involved in science outreach work, he spends considerable time engaging with young men and women in colleges and schools across the country.

What began as a beautiful birdwatching holiday to Arunachal Pradesh for Ramana has turned into his life's work and mission. Ramana's spirited fight for the natural world and for the dignity and sustenance of local communities is a beacon in the world of today.

Dr. Ramana Athreya works to untangle the complexities of biodiversity conservation and community sustenance.

COURTESY RAMANA ATHREYA

COURTESY RAMANA ATHREYA

ABOVE LEFT *Dr. Ramana Athreya with his students in his molecular-ecology lab at the Indian Institute of Science Education and Research (IISER), Pune.*

ABOVE RIGHT *Dr. Ramana Athreya has been mentoring the* Bugun *tribal community to involve them in protecting the* Bugun liocichla, *a bird he first described in 2006, and its habitat.*

ARUN VENKATARAMANAN

Conservationist, educator and forest-nurturer

It was when the electronic boom began on the cusp of the Internet era that Arun, a young engineer in Mumbai, joined members of the Bombay Natural History Society on long forest walks. The interactions led him to ask: "How should I spend my life's energy?" The answer came from within him and since then nature conservation has remained his true calling.

In 1997, he began teaching Environment Education at the Krishnamurti Foundation School in Chennai, where he remained for 12 years. This shifted his worldview. In 1997, he also joined the Students' Sea Turtle Conservation Network (SSTCN), becoming the group's coordinator in 2002. With the SSTCN, Arun helped protect the eggs of olive ridley turtles that nested on Chennai's beaches, safely releasing newborn hatchlings, creating awareness on environmental issues through discussions with groups during turtle walks every weekend, and by speaking with children and their teachers in schools and colleges.

In 2009, Arun and his wife Poornima moved to Thiruvannamalai with their two children. Committed to safeguarding nature, the couple, with like-minded friends, launched a project called 'The Forest Way' where they ran environmental education activities, reforestation drives on the Arunachala Hill, and skill share workshops for locals. They also began a small alternative school for children from all socio-economic backgrounds in Thiruvannamalai. Called the Marudam Farm School, it teaches life skills including farming, gardening, carpentry, pottery, tailoring, cooking… along with academics. The school has been written about in many magazines and journals for its emphasis on sustainable living and its holistic approach to education.

Arun also conducts birding trips, nature education camps, tree walks and environmental education programmes for groups seeking to connect with nature. A man of many parts, he also happens to be the Secretary of the Annamalai Reforestation Society since 2018, and has been its treasurer since 2012. He currently collates and documents the biodiversity of the region he knows so well, through the India Biodiversity Portal, e-Bird and inaturalist.

The values that Arun, his wife and their team have carefully instilled in so many youth have clearly made a deep impact on the couple too. Attempting to walk lightly on the Earth, leaving behind the smallest possible ecological footprint, the family lives in a thatched house on an organic farm powered solely by solar energy. Arun uses public transport whenever possible and has not taken a flight in 25 years!

This man, in so many ways, is years ahead of his time, with each day a sincere pursuit in shifting perspectives. Without exaggeration he has dedicated his entire life to protecting and safeguarding not just nature-in-a-silo, but our collective future writ large.

COURTESY ARUN VENKATARAMANAN

COURTESY ARUN VENKATARAMANAN

ABOVE LEFT *Committed to safeguarding nature, Arun Venkataramanan and his team reguarly conduct education activities, reforestation drives and skill share workshops for locals.*

ABOVE RIGHT *An alternative school founded by Arun and his friends for children from all socio-economic backgrounds emphasises sustainable living and has a holistic approach to education.*

Through discussions, nature education camps, birding trips, tree walks, and environmental education, Arun Venkataramanan is transforming minds.

PANCHAMI MANOO UKIL

Birder, author and conservationist extraordinaire

The ancient Haudenosaunee philosophy of the *Iroquois* in North America flows beautifully through Panchami Manoo Ukil's life: 'decisions we make today should result in a sustainable world seven generations into the future'. Her parents, Panchami, and the hundreds of children and adults with whom she interacts bear this philosophy.

Panchami inherited her love of nature from her parents who were avid lovers of the outdoors and looked upon plants like children to be cared for and nurtured. Their lifestyle centred on living in harmony with their surroundings, as does Panchami's.

Her brainchild 'The Bhubaneswar Bird Walks' began in 2012, and, later, she co-founded 'Song of the Wild' to work on deeper issues of wildlife conservation. With the first ever bird walks in Odisha, she helped create a culture of birdwatching in the state. The success of the initiative enhanced avian studies and field work in the region – for instance, the discovery of nesting of the endangered Indian Skimmers *Rynchops albicollis*, in Mundali.

Fondly known as *Pakhi* Panchami (Birdie Panchami) in Odisha, she works with young and old alike to promote knowledge, compassion and coexistence with nature. Panchami, an educationist, is Vice Chair and School Leader at the DN Wisdom Tree Global School. She introduces children to plants, birds and animals, and explains how the intricate web of life links us all. She believes that creating awareness in children is a good way to bring adults into the arena of nature conservation.

A part of Panchami's heart belongs to Mangalajodi, the wetland on the northeastern fringe of Chilika Lake. Working with local bird guides and boatmen down the years, she successfully managed to get Corporate CSR and community leaders to support and inspire these former poachers so that they continue to be protectors of the local biodiversity. She had understood that this would only be possible if the community became the direct beneficiaries of biodiversity restoration.

Her writing and lobbying opened up Mangalajodi to the outside world and helped turn local boatmen into expert bird guides, who now find their economic and social circumstances greatly improved thanks to increased visitation that often caused boats and homestays to be overbooked! Most houses in Mangalajodi now have functional toilets, solar power, and safe drinking water. A community centre was established and well-wishers soon made better equipped boats, binoculars and bird guidebooks available through Odisha's many active NGOs who help upskill local youth.

Panchami is currently working on a book on the birds of Odisha. She is undoubtedly one of her state's finest bird ambassadors with a deep commitment and belief that the youth in the fishing community are destined to be the most effective conservationists of tomorrow.

COURTESY PANCHAMI MANOO UKIL

SUDARSHAN SHAW

ABOVE LEFT *By conducting the first ever bird walks in Odisha, Panchami Manoo Ukil helped create a culture of birdwatching in the state.*

ABOVE RIGHT *This illustration by 25-year-old wildlife cartoonist Sudarshan Shaw is a lovely representation of all the things that Panchami loves – birds, wildlife, children, photography, writing and her state Odisha.*

Panchami Manoo Ukil's efforts opened up Mangalajodi to the outside world and helped turn local boatmen into expert bird guides.

SHABIR HUSAIN BHAT

Naturalist, guide and wild whisperer

Think Jammu and Kashmir, and views of vast, snow-capped mountains and deep, unexplored forests spring to mind. And now, for us at Sanctuary… Shabir Husain Bhat!

A passionate naturalist born in Srinagar, he is one of Dachigam National Park's most dedicated conservationists. Over the past 15 years, he has worked as a naturalist-guide, continuing an unbroken tradition passed down from the likes of the late Qasim Wani (Lifetime Service Award 2001 winner), Abdul Rahman Mir and Nazir Malik (Wildlife Service Awardees 2003 and 2016 respectively).

Even a short walk with Shabir through the magical forests of Dachigam, watered by the glacial Dagwan river, reveals the wonders of the park – the 'old man's beard' *Chionanthus virginicus* billowing wispily by the path, bear droppings strewn on the forest floor and mulberries for them hanging on welcoming branches! Visitors who have walked with him call him the 'Encyclopaedia' of Dachigam.

Even as a child, Shabir was drawn to wildlife. He vividly remembers trekking mountains for birding and visiting the 'Brein Nishat Conservation Reserve' near his home to watch wildlife.

But it was one specific animal that gave Shabir definitive purpose and direction. And the Dachigam National Park was its only home. To date, the critically endangered and enigmatic hangul deer, or Kashmir stag *Cervus hanglu hanglu* (*Sanctuary* Vol. III No. 2, April/June 1983) continues to be the focus of his life. And joining the park as a naturalist and guide was the way he chose to wake up and sleep everyday in the proximity and service of the animal he loved.

Friends and distant family continue to exhort him to seek more lucrative jobs, but his resolve remains unwavering. The sight of elusive females with fawns, he says, is all the motivation he needs. His day is, of course, replete with creatures and plants he loves – the Himalayan black bear, for its critical role in seed dispersal in the forests, the golden-yellow autumn leaves of the mulberry plant, or the mighty oak and walnut forests that so typify Dachigam.

Shabir is fortunate to have the unconditional support of his immediate family for his life's work. A visionary, he insists that the future of Dachigam and its natural wonders depend almost entirely on support from the hardworking communities living in Dachigam's periphery. This is why we identified him as one of those chosen to be supported in every way possible. A son of the soil, he says with conviction born of experience that to conserve the endangered and not-so-endangered species of Dachigam, he intends to study their biology, ecology and behaviour.

Walking beside their tracks in the sand, lightly leaving his own prints behind, Shabir Husain Bhat belongs to Dachigam and Dachigam belongs to him. Like the hangul and Himalayan black bear, this jungle is his home.

COURTESY SHABIR BHAT

COURTESY SHABIR BHAT

ABOVE LEFT *Even a short walk with Shabir through the magical forests of Dachigam reveals the wonders of the park. No wonder, visitors who have walked with him call him the 'Encyclopaedia of Dachigam'.*

ABOVE RIGHT *Shabir, seen here with his parents, wife and children, is fortunate to have the unconditional support of his immediate family for his life's work.*

A passionate naturalist, Shabir Husain Bhat is one of Dachigam National Park's most dedicated conservationists.

YOUNG NATURALIST AWARD

Driven youth leader who sets an example for his or her peers and older generations alike, through a thirst for knowledge and conservation entrepreneurship… motivated by hopes of a sustainable future on planet Earth.

MUNMUNI PAYENG

Conservationist, public speaker and leader

When your parents' legacy is an over 40-year-old thriving forest, it is little wonder that your pockets are full of seeds, your head full of big ideas, while your feet remain planted firmly on the ground. That's 24-year-old Munmuni Payeng – daughter of 'Forest Man of India', Jadav Payeng (*Sanctuary* Vol. 32, No. 12, December 2012), who strives for ordinary things: to be a good person, work hard, help people and rewild Earth by working with nature. Armed with such seemingly humble aspirations, she makes the extraordinary possible.

She is currently one year into a rewilding mission in collaboration with local community members who have bought into her family's dream of mothering a forest of one million native trees on sandbars close to the Molaikathoni Forest.

As the Secretary of the Forest Man Foundation, she gives direction to the environmental and social initiatives for communities living close to the parcel of land they have identified. She is also a founding member of Seuj Dhoroni (Green Earth), that communicates nature conservation at the grassroots level. Aware of the vital importance of involving the young from near infancy, she routinely organises school and community awareness programmes at Assam's Majuli and Jorhat districts in collaboration with the Green Guard Nature Organisation.

In 2020, after seeing a post on Facebook about Nizora Phukan's mission to walk from Charaideo to New Delhi – to raise awareness about nature conservation, Munmuni reached out to the young environmentalist and decided to accompany her between Jorhat and Guwahati, a distance of over 300 km. This offered her a unique platform to share her own vision and plans to conserve nature with an increasingly active following.

With her two younger brothers, cousins and friends she works day after day on their ambitious project to see a natural forest of one million trees emerge as a way of assuring a home to wild species being edged out from Assam's fast-vanishing wilds. With them in their mission are members of the *Bihari*, *Mising*, *Ahom* and other *adivasi* communities. Scattered among the lakhs of trees that have already established themselves are *Bombax ceiba*, mango, jackfruit, and Indian jujube. Undeterred by the frequent flooding in the area and the welcome rearranging that wild elephants tend to do, the group is happy to continue undeterred, knowing that the legacy gifted by her father will continue to grow because she will never give up.

COURTESY MUNMUNI PAYENG

COURTESY MUNMUNI PAYENG

ABOVE LEFT *Munmumi Payeng is currently one year into a rewilding mission in collaboration with local community members who share her family's mission of creating a forest of one million native trees on sandbars close to the Molaikathoni Forest .*

ABOVE RIGHT *Aware of the vital importance of involving the young from near infancy, Munmuni routinely organises school and community awareness programmes in collaboration with the Green Guard Nature Organisation.*

Munmuni Payeng gives direction to the environmental and social initiatives of local communities.

GREEN TEACHER AWARD 2022

SUPRABHA SESHAN

Educationist, forest custodian and earth doctor

Since childhood, Suprabha has experienced a deep sense of belonging with the natural world. Encouraged by her family and together with various peers, she explored wild places throughout her youth. She read and wrote on the subject, prepared appeals to save wildlife, and routinely rescued injured and orphaned animals. She also organised hikes and nature activities for younger kids at school.

After obtaining her degree in Earth Studies from the U.K. in 1989, Suprabha spent the next two years travelling in search of wildness and wildernesses. When she eventually returned to India, with a few friends, she visited the Gurukula Botanical Sanctuary (GBS) – a community-led conservation centre in Wayanad, Kerala. Founded by the late Wolfgang Theuerkauf, GBS focuses on the rescue and protection of endangered plant species of the Western Ghats. Scheduled to spend 10 days there in the winter of 1992, she discovered she had found her calling in life – "rainforest conservation". She and her friends extended their stay. As for Suprabha... she never left!

Today, as a long-term custodian of GBS, she undertakes much of its educational and outreach activities, including supporting various restoration initiatives in the Western Ghats. She is one of the co-founders of GBS's School in the Forest, a broad collaborative initiative with educators across the region. A creative and enthusiastic educator, Suprabha has also been a core member of a team that runs 'Landscapes and Lifeskills', a five-month programme for young adults, many of whom have embraced vocations in restoration and conservation.

Suprabha is devoted to protecting old growth forest and to recovering degraded land to forest. She and her colleagues have painstakingly nursed a rainforest habitat with a myriad plant species back to life, and speak of their work as "ecosystem gardening". Every such recovery contributes to restoring the micro-climate and raising the water table. As the rewilding process unfolds, rare native animals, birds, and insect species – many highly endangered – have begun to return. Members of local communities, who are still intimate with the natural world, discover how they too can further contribute to, and benefit from, such self-sustaining ecological nurturance practices.

Through her life, Suprabha has designed and directed several research and restoration projects, both at GBS and at other botanical wonderlands such as the famous Mukurthi National Park and the Tala Cauvery Temple Sanctuary. She is now working on a 'Canopy Care' project, focusing on the tender plant species of the rainforest canopy. For her missionary work, Suprabha received the prestigious Whitley Award in 2006, which she accepted on behalf of the Gurukula Botanical Sanctuary.

Proof of the regard with which Suprabha is held by her contemporaries can be gauged by the many roles she plays with different environmental organisations and collectives: She is a co-founder of the Munnarakkunnu Trust in 1996 and since 2014, its Managing Trustee; she is the Coordinator of the Green Phoenix, an outreach wing of GBS that works on public and common lands, on river, forest, wildlife, community and food issues. Since 2009, she has also been a Trustee at The Forest Way Trust, Thiruvannamalai, Tamil Nadu, and a Trustee at the Environmental Support Group – India, Bengaluru since 2016. She is a member of the IUCN Western Ghats Plant Specialist Group and of the Coalition of Environmental Justice of India. She is also a Fellow with Ashoka Innovators for Social Change and serves on the Steering Committee of the newly-formed Ecological Restoration Alliance-India.

This resolute nurturer of India's wilds has spoken regionally and internationally about the ecological basis for a healthy planet. She invites us all to explore life as part of a community with non-humans, and passionately underscores the two contrasting aspects of nature that ecosystem gardeners know well and work with: resilience and fragility.

COURTESY SUPRABHA SESHAN

ABOVE *As a long-term custodian of the Gurukula Botanical Sanctuary in Wayanad, Kerala, Suprabha Seshan undertakes much of its educational and outreach activities, including supporting restoration initiatives in the Western Ghats.*

Suprabha Seshan and her colleagues have painstakingly nursed a rainforest habitat with a myriad plant species back to life.

COURTESY DR. VIBHU PRAKASH

The *Sanctuary* Interview

Meet Dr. Vibhu Prakash

Wildlife biologist ***Dr. Vibhu Prakash*** *(also see page 27) has spent over four decades with the prestigious Bombay Natural History Society, where a major part of his work was heading the internationally acclaimed Vulture Conservation Programme that has been instrumental in the recovery of three Gyps vulture species.* ***Bittu Sahgal*** *speaks with Sanctuary's Lifetime Wildlife Service Award winner of 2022 about his foray into wildlife conservation, his dedication to raptor studies and vulture recovery and why he says there are no shortcuts in conservation.*

Vibhu, could we start with you telling us something about your growing years? Well, I was fascinated by nature since childhood and was certainly different from other children my age – constantly on the lookout for animals, birds and plants. I was shy and tended to avoid spending too much time with my classmates and other neighbourhood children. I preferred instead to roam the outdoors alone, observing plants and animals. Dogs, cats, rats, frogs and insects would attract me the most. I always dreamt of having my own farmhouse and would keep a host of different animals. I had even planned to earn a living through a poultry farm with free-ranging chicken!

And where did natural history, which has been your life, come in? Living in a small town like Meerut, I had limited access to good literature on natural history, so I depended largely on articles in newspapers and magazines. My mother, an educator, who was aware of my interest in nature, encouraged me to read and would share any articles that she came across.

How did you venture into nature as a life choice and who were your heroes, your inspirations? I was particularly fascinated by the writings of Jim Corbett. I read his book *Man Eaters of Kumaon* several times and I believe that played a major role in getting me hooked on nature and wildlife. I was absolutely sure I was going to live a life that kept me close to one forest or another and, on the advice of my mother, I decided to try for the Indian Forest Service (IFS).

And the Bombay Natural History Society (BNHS)? How did your life become entwined with the Grand Old Society? It was a dream come true! In the late 1970s, while I was studying for my graduation, I often went birding along a large drain called the Abu Nullah that flowed through Meerut city. Both sides of the water course were thickly vegetated, which attracted a large variety of birds. One day, a huge flock of European Starlings caught my attention. At the time I had no idea what these noisy, brightly-coloured birds were, and to find out, I purchased the *Book of Indian Birds* by Dr. Sálim Ali, but could not find them in the book. So, I wrote to Dr. Sálim Ali and to my great surprise and delight, I actually got a response! From that point onwards I would frequently send him letters about new birds that I came across and he would always write back.

And how did that turn into a lifetime association with the BNHS? On an impulse I wrote to Dr. Sálim Ali to ask if I could work with him on birds! It so happened that my brother married a girl from Mumbai and she suggested I write to the BNHS for employment. Priyali Prakash, my sister-in-law, heard there were vacancies for field biologists at the BNHS and I began preparing my application to join. Dr. Sálim Ali sent me a letter in response, inviting me for an interview for BNHS's Avifauna Project in October 1980. The interview panel was chaired by Dr. Sálim Ali himself and he asked me a number of questions on birds, mostly based on my letters to him. On December 17, 1980, I was selected and was asked to join an ongoing BNHS project at a large, brackish-water bird haven called Point Calimere in Tamil Nadu.

That's quite something! Not everyone is ever that lucky! True! The project site was located right on the seashore and I threw myself into the work, which was very exciting… a dream come true, really. I was a quick learner and discovered different census techniques to estimate bird numbers for species including flamingos and waders. The Avocets were particularly fascinating, as they flew in a formation just above the wetland. Each morning, we would ring hundreds of waders, caught the previous night, to study their migration. It was pure heaven for me to hold the delicate birds in my own hands. I still vividly remember ringing a very rare bird, the Spoon-billed Sandpiper *Calidris pygmaea*.

And that was only the start of your tryst with avians! Yes! After three months of training, I was transferred to the Keoladeo National Park, Bharatpur, a paradise for both waterbirds and raptors. The wetlands were full of Spotted, Steppe and Fish Eagles and Marsh Harriers. I was appointed as a biologist in Dr. V. S. Vijayan's team. Dr. Vijayan, an accomplished wildlife scientist, was himself Dr. Sálim Ali's student. He gave me the responsibility of studying raptors (birds of prey) in the park and that became the subject of my thesis, *The Ecology of Raptors in Keoladeo National Park* starting 1984, with Dr. Vijayan as my guide.

From a small *nullah* in Meerut to the centre of one of the world's finest natural history organisations within a few short years. What a meteoric journey! I could not have asked for more. I was given independent charge of a project on the *Status and Distribution of Resident Raptors* in India and threw myself into gathering data on various resident species between 1990 and 1993. This included studying raptors at the Velavadar National Park, Gujarat and then in the Rollapadu Wildlife Sanctuary in Andhra Pradesh between 1996 and 1999, with a key focus on the effect of environmental contamination on raptors. It was then that I documented the crash in Gyps species of vulture populations across the country and my focus has not changed since then. Vultures, their biology and conservation have been my life for over two decades.

Did you interact with 'The Old Man' over the years? I was influenced by him constantly, but my only real contact with Dr. Sálim Ali was during his visits to Bharatpur. Going birdwatching with him in this national park was a huge learning experience. I clearly recall how delighted he once was

ABOVE *Dr. Vibhu Prakash with the then Member secretary B. S. Bonal, IFS and Director BNHS, Dr. Asad Rahmani in 2012 outside the BNHS Hornbill House.*

FACING PAGE *Dr. Vibhu frequently corresponded with Dr. Sálim Ali while growing up, which led him to study birds later in life.*

BELOW *Dr. Vibhu's Ph.D. thesis was based on the ecology of raptors in the Keoladeo National Park. He also did seminal work on the crash of populations of* Gyps *vultures.*

PUBLIC DOMAIN/P. JEGANATHAN

SAURABHSAWANT

ABOVE *Dr. Vibhu and his team releasing a Cinereous Vulture at the Vulture Conservation and Breeding Centre site in Pinjore in 1997.*

ABOVE *A Red-headed Vulture being tagged for a satellite telemetry project.*

ABOVE *Dr. Vibhu Prakash along with his wife Dr. Nikita, were the principal researchers at the Pinjore Centre, which was supported by the BNHS and RSPB.*

to see a Spotted Grey Creeper's (Indian Spotted Creeper) nest, one of his favourite birds. He wanted us to study the bird. He had a reputation of being a difficult taskmaster, and a short-tempered one at that, but while birding, he was extremely pleasant and would describe the behaviour of the birds in detail. He would watch every bird intently, taking time to identify them, and would smile if he was satisfied with his identification.

He once came to see us at the bird ringing site. I was measuring the wing length of a Whiskered Tern. He asked me the length, checked the recorded range of measurements in the book and gave me a very stern look as the length that I had measured was shorter than the recorded range of wing length. He asked Dr. Vijayan to measure it again and then asked to pull out all the records of Whiskered Tern wing length measurements. He said quietly to me: "Inaccurate measurements are useless for scientific studies," and walked away. This was a life lesson on the care that must be taken in recording scientific observations.

Tell us about raptors, which have been a constant in your life! Yes, birds of prey are still my first love. I got interested in raptors during my stay at Point Calimere, when Ajai Saxena, who later joined the IFS, showed me a male Eurasian Kestrel roosting in the roof of our quarters. It would come every evening, almost at the same time, and would stay through the night. Ajai also explained its identification and habits and I found myself watching the bird every evening and morning, when it would leave its roost. I found its behaviour of hovering at one place, intently looking for prey, particularly fascinating. When I was sent to Bharatpur, which in my view is probably the best place in the world to watch raptors, it was a dream come true.

And your tryst with vultures? Our colleague, S. Subramanya was good at raptor identification and I started accompanying him to watch these avian hunters. As part of my Ph.D. on the study of the ecology of raptors, my guide, Dr. Vijayan, helped me scientifically design my raptor study and he was the one who encouraged me to collect information on all species of raptors, including vultures.

Fascinating yes, but it must also have been exhausting work? It was. I had a difficult morning to evening schedule to follow for four full years from 1984 to 1988. In those years I studied about 43 species, with a focus on the breeding biology of five specific species – Pallas's Fish Eagle, Lesser (Indian) Spotted Eagle, Greater Spotted Eagle, Short-toed Eagle and Black-shouldered Kite. I also studied the nesting distribution of Oriental White-backed Vulture, King or Red-headed Vulture, Egyptian Vulture, Crested Honey Buzzard, Dusky Horned Owl, Mottled Wood Owl, Collared Scops Owl and Spotted Owlet.

And how do you feel about your role in the miraculous rescue of vultures from oblivion? I have to say I feel a deep sense of satisfaction to see a successful Vulture Conservation Breeding Programme in place in India. This gives me hope that we will actually be able to prevent the extinction of vultures. Vulture populations are also reviving in the wild and are stabilising because of several conservation measures taken by Central and State Governments. But we have no room for complacency. Our job is far from done, as vulture populations are still small and highly vulnerable. Until there is a policy decision mandating restriction in the use of vulture-toxic drugs in treating livestock, vultures will continue to be under threat.

In that case, if you had a magic wand, what would your three wishes be? a) A complete ban on the use of synthetic toxic chemicals including pesticides and insecticides in agriculture and forestry. b) Best practices followed in veterinary care of domestic and wild animals. c) Designated inviolate areas for both humans and wild animals.

How did you feel when the Government of India recently honoured you for the vulture success? It was a great honour, especially so because vultures are not charismatic, cuddly creatures. The honour really goes to our entire team.

Tell us about the partnership between the BNHS and the Royal Society for the Protection of Birds (RSPB)?

The RSPB has been a great support in vulture conservation. They helped us both financially and technically in the programme. Their promise of financial support in establishing and running the Conservation Breeding programme was crucial to its success. The BNHS played the role of an anchor and invited expertise from national and international organisations for vulture conservation. RSPB also helped obtain technical support from other international organisations, while the BNHS worked with a range of State Governments, doggedly continuing its work in the field and setting up successful breeding centres.

So, are you hopeful for the future of vultures? Yes, I believe we have it within us to prevent vultures from going extinct… but only if our conservation efforts remain constant and policymakers work with us to keep vulture populations healthy and free from contamination from toxic pharmaceuticals such as diclofenac and other NSAIDs, that have proven to be equally dangerous for vultures.

Any message for young scientists? Conservation of species is a long-term effort. Determining the population size of any species is just the beginning of conservation. Regular monitoring to determine population trends, finding the cause of decline in populations and initiating and evaluating conservation measures are very important for developing any conservation strategy. There are no shortcuts in saving a species. And your work to protect the biodiversity of our planet has only begun to be understood by people as an issue concerning human survival itself. Stay true to yourself and true to science and trust the biosphere to fix itself, provided humans learn to respect nature's imperatives.

I feel a deep sense of satisfaction to see a successful Vulture Conservation Breeding Programme in place in India. This gives me hope that we will actually be able to prevent the extinction of vultures.

We have it within us to prevent vultures from going extinct… but only if our conservation efforts remain constant and policymakers work with us to keep vulture populations healthy and free from contamination from toxic pharmaceuticals.

Veterinary Drug Diclofenac – the main cause of the crash in vulture populations

Diclofenac, a veterinary non-steroidal anti-inflammatory drug (NSAID), was found to be responsible for the crash in vulture populations in 2004. It is a wonder drug for cattle and humans and gives relief within 15 minutes of administration as it could break the blood-brain barrier. The drug is completely excreted from the animal's body within 72 hours but if the animal dies before that period, the residues of the drug remain in the body forever. If vultures feed on such an animal carcass, they are exposed to the drug, which is extremely toxic for them and causes renal failure and mortality even in very minute quantities (0.2 mg./kg. of the vulture's body weight). The presence of diclofenac even in less than 0.1 per cent of the cattle carcasses available to vultures could cause a catastrophic decline in the raptor's populations. Over 10 per cent of the cattle carcasses were found with drug residues in 2006. The Government of India banned the sale, manufacture and use of veterinary diclofenac in 2006, which was gazetted in 2008, and with another gazette notification in 2015, it restricted the manufacture of the vial size of human formulations of diclofenac to just 3 mL. ampoules to prevent their misuse in treating livestock.

Three other veterinary NSAIDs have been found to be toxic to vultures and cause acute kidney failure. They are ketoprofen, nimesulide and aceclofenac. Unfortunately, they are still not banned for veterinary use. In fact, the drug aceclofenac is a pro-drug as it gets converted into diclofenac within a few hours of administration and has the same harmful effect as that of diclofenac on vultures. It needs to be banned for veterinary use as soon as possible.

Only two NSAIDs, meloxicam and tolfenamic acid, have been found to be safe for vultures.

GNANESHWAR C.H.

CLOSE ENCOUNTERS

of the scale-y kind

By Trishala Ashok

When I think back to the day I had a close encounter with the Indian cobra *Naja naja*, this story pretty much writes itself.

NOT A WALK IN THE PARK It all goes back to the good old mask-free days when we could meet like-minded strangers, take long walks in the field, and bond over our interest in wildlife. A group of nature enthusiasts and I signed up for a walk in Chennai with the *Irulas*, the largest Tamil-speaking tribe of Tamil Nadu. They are known for their indigenous knowledge of capturing wild animals. From invasive rats in paddy fields and fleet-footed monitor lizards, to venomous snakes and scorpions, these indigenous hunters don't fear any creature!

Snakes are possibly the most misunderstood amongst all wildlife. Most of the fear stems from the stories that have been woven into cultural beliefs.

Reading the compelling story of how these hunter-tribes transitioned to snake conservation, and their legendary field tales of their skilled tracking of the "big four" snakes were exactly the motivation I needed to sign up for this walk on a hot Chennai summer morning.

The walk starts early in the morning and usually takes place on the outskirts of Chennai, near farmlands. Agricultural fields are hotspots for reptilian and amphibian activity, so for anyone cutting their teeth on herping, this was the place to be. But tracking snakes in the scorching heat wasn't exactly a walk in the park. After looking for reptiles for more than four hours, we decided to rest under the shade of what seemed to be the only green tree in the vast agricultural landscape. We snacked on some warm fruit juice and biscuits. Our eyes constantly scanned the branches for the shiny scales of a bronze-backed tree snake, or the glowing yellow eyes of a green vine snake. There was a lot of chitter-chatter from birds perched in the trees, but birding had to take a back seat that day. When we had no luck spotting tree snakes, our attention turned to an army of ants on the ground, crawling in a straight line, going about their busy day.

GNANESHWAR CH

DE-ESCALATING THE FEAR Kali, the son of the famous *Irula* snake catcher Chockalingam, walked towards us holding a snake. As he walked closer, we recognised the brown colubrid snake in his hands – the Indian rat snake *Ptyas mucosa*. Rat snakes act as nature's pest controllers. Their presence helps control the population of agricultural pests such as rodents. This behaviour has rightly earned them their title of 'farmer's friend'. Excited to see our first reptile of the day, we bounced up to meet and greet the lovely specimen. I watched Kali calmly handle the snake by supporting its weight with his hands and allowing it to move with absolute ease. If the snake moved too forward, he would gently place his hand below its neck and loop it back. This 'loop-the-loop' synchrony calmed the snake down. A snake's usual defence mechanism is to inflate its body when it feels threatened. I watched it deflate slowly, and get comfortable with every loop. After we had all had our share of admiring the 150 cm. long snake, it was time to let it go. Some of the participants were initially apprehensive to stand close to the snake but after encouragement by others, they were thrilled by their first experience of interacting closely with a non-venomous reptile. Watching their fear turn into excitement with such a simple encounter made me think about how a positive approach like this can help turn things around for snake conservation in India.

Herpetologist Ajay Kartik, who earlier worked with the Madras Crocodile Bank Trust (MCBT) and the *Irulas* for over a decade, believes that a walk with the tribe is a good way to learn about snakes and their ecology. He shares, "Since these walks are usually conducted on the outskirts of Chennai, the experience gives city folk a good idea about snakes in peri-urban areas, which have been proven to be crucial habitats. Participants of the walk also get to experience what an average morning for an *Irula* is like." He adds that seeing snakes in the wild is a different experience – "The snakes at MCBT are captive-bred and are used to people when compared to snakes in the wild. Some visitors – especially children – feel a lot more differently towards snakes after watching employees gently handle snakes."

ABOVE *The genus* Daboia *means "the lurker" or "the hidden" in Hindi from which the nomenclature for* Daboia russelii *has emerged. On account of their gregarious nature, and preference for peri-urban as well as agricultural areas, this genera is responsible for causing the most snakebite incidents, leading to fatality, among all venomous snakes.*

FACING PAGE *Agricultural fields are hotspots for reptiles such as this Russell's viper, as well as amphibians.*

Before we talk about such interactions and their influence on the minds of serpentine-fear-stricken people, we have to first understand why this knowledge gap about snakes persists.

Snakes are possibly the most misunderstood amongst all wildlife. Most of the fear stems from the stories that have been woven into cultural beliefs. Even modern cinema and television serials tend to portray snakes as 'vicious' or 'dangerous'. Every scene with a snake – always a cobra – is accompanied by ominous music playing in the background. Media reports of snake encounters always begin with frightening headlines, adding fear to the audience's mind. Moreover, in this era of social media influencers, videos of unethical rescues of venomous snakes or misleading facts often go viral on the Internet. With the country's

Herpetologist Gowri Shankar believes that if people are interested in rescuing snakes, they should be willing to learn about the scientific and ethical methods of rescue.

ELLIOT PELLING

ELLIOT PELLING

GNANESHWAR CH

ABOVE *Gently handling the cobra with a snake hook,* Alamelu, *a member of the* Irula *tribe, impresses participants on the walk with her snake-handling technique.* Irulas *– a tribal people whose traditional skills included snake-catching – lost a major source of income when snakeskin export was banned in 1976. The Irula Co-operative Venom Centre aims to replace this lost income with the help of a valuable resource – snake venom, in a sustainable manner.*

rapid increase in population and habitat alterations, encounters with snakes have been on the rise over the last few decades, making snake rescuers busier than ever before. Awareness of ethical rescue protocols still seems to be one of the missing pieces of the puzzle in snake conservation.

Gowri Shankar, a herpetologist and Director of the Kalinga Centre for Rainforest Ecology (KCRE), believes that if people are interested in rescuing snakes, they should be willing to learn about the scientific management of rescues. He says, "When it comes to fatalities caused to humans on account of wildlife conflict in India, snakes are in the top five. Unlike other wild animals such as leopards, tigers and elephants, rescues of snakes take place on a day-to-day basis all over the country. Even though there are a lot of snake rescuers these days, many of them are not aware of the proper techniques when it comes to handling snakes safely, which are crucial in order to avoid accidents during rescues. Years ago, when I got into this field, there was limited information available. I would interact with my seniors and learn from them. These days, there is a lot of information available in books and online, but scientific and ethical rescue methods are still absent."

There is something magisterial about cobras, which makes them more impressive than vipers and kraits. Not only do they have a striking posture, but they also stare into your eyes as if they aren't intimidated by your size.

Gowri has been working with king cobras – the longest venomous snakes in the world – for around two decades. His recent ground-breaking study identified the four lineages of the king cobra, earlier thought to have been one lineage. His discovery could lead to more effective production of anti-venom to treat king cobra bites across East and Southeast Asia. But evolutionary science is not all this snake conservationist is known for. KCRE has been conducting various workshops in Chennai and Mysore for around 10 years. With their Scientific Training of Reptile Management (STORM) certificate workshop, Gowri has successfully educated over 900 people. He has

ARUL VENKATESHWARAN

ANUROOP KRISHNAN

ABOVE RIGHT *Gowri Shankar addresses participants of the King Cobra Bionomics and Conservation Annual Workshop at the Kalinga Centre for Rainforest Ecology (KCRE).*

ABOVE LEFT Irulas *earn their living by catching cobras, vipers and kraits, and handing them over to venom labs. They are out and about looking for the big four snakes almost every morning, and spend most of their day looking for these species.*

also worked with forest officials across various states and has managed to educate them on snake rescue, ecology and behaviour.

Most people think snakes want to deliberately attack us. They are unaware that snakes do this for self-defence. My close encounter with a cobra helped me understand this better. Let's return to the story of my day out with the *Irulas*.

FACE TO FACE WITH THE INDIAN COBRA After an uncomfortable break, where we spent our time fidgeting with small twigs in the burning heat, we resumed our quest. The task of looking for snakes on an empty stomach seemed daunting, but the anticipation of finding one was thrilling. We had great luck with some non-venomous snakes such as the green vine snake, another friendly rat snake, and a super-friendly buff striped keelback, but were not as fortunate to encounter the snakes we were all hoping to meet. Like all star-struck herpers, we were determined to see at least one of the famous four.

We were on the verge of giving up, but the hard-working tribesmen continued looking. "*Irulas* earn their living by catching cobras, vipers and kraits, and handing them over to venom labs. They are out and about looking for the big four snakes almost every morning, and spend most of their day looking for these species," shares Ajay Kartik.

Finally, after hours of searching, an *Irula* came up to us, grinning. From the excitement on his face, we could all tell that he had found one of the big four snakes! He opened the bag to show us. It was a sub-adult cobra.

But something seemed slightly off. The scales were covered with a greyish layer of skin. The snake was about to shed its skin! Snakes shed skin throughout their lives and during this moulting phase, they are extremely agitated, so it is advisable to leave the snake alone and not use it for milking. As the *Irulas* took the snake out of the bag, we took our cameras and phones out of ours. For me, the most cosmopolitan snake is the cobra. There is something magisterial about them, which makes them more impressive than vipers and kraits. Not only do they have a striking posture, but they also stare into your eyes as if they aren't intimidated by your size. It was a stunning specimen and words still fail me. For the next few minutes, all one could hear was a symphony of camera clicks.

After a few minutes of being possessed by the shutterbug, we decided to let the snake go. I stepped back and kneeled down to watch the release. Before I could even focus my camera, the snake was already moving. What happened next was a life-changing experience for a wildlife rookie like me. The snake passed within a hair's breadth of my shoe, and rapidly disappeared into the thicket. As shocked as I was, I stayed calm, because I knew that was the right thing to do. It was at this moment that I realised how misunderstood snakes are.

FUTURE OPTIONS With India reporting 50,000 fatalities from snakebites every year, the sustained efforts and the bravery of the *Irula* community to tackle the country's snake-bite conundrum is the need of the hour. But dealing with venomous snakes can put even a skilled snake whisperer at risk. "The *Irula* community puts their life on the line by dealing with venomous snakes daily. People believe that they are immune to snake bites, but this is a misconception. The *Irulas* have been working with snakes for generations, so they are aware of the consequences and seek timely emergency treatment if any such incident occurs," says Ajay Kartik.

What does the future of snake conservation look like? Gowri Shankar believes that more scientists need to convey their research findings with communities by conducting awareness programmes. He says, "That is when science will reach people. This can help us address the knowledge gap and mitigate snake conflict in India. We need to ensure that the right information is shared on the Internet, television and in the media. Concerned authorities should be informed so they can take strict action. It is also important for rescuers to work in tandem with the local Forest Department." Like all social and environmental issues, awareness is the greatest agent of change.

A FAILED COP27 COMMITS TO LOSS AND DAMAGE

Text and Photographs by Shailendra Yashwant

The 27th conference of parties (COP27) of the United Nations Framework Convention on Climate Change (UNFCCC) finally closed in the wee hours of November 20, 2002, with a 'breakthrough' agreement to provide 'loss and damage' funding for vulnerable countries hit hard by climate disasters, sending a cheer among the delegates from island nations, vulnerable countries and civil society organisations, while also giving a lease of life to a multi-lateral process that has otherwise left the world on the brink of a climate catastrophe.

Creating a specific fund for loss and damage has been a longstanding demand of those who are least responsible and worst impacted by climate change, and its announcement marked an important point of progress, for climate justice as well as pinning responsibility on the historical emitters.

A bittersweet win, because the COP failed in garnering commitments from nations to increase their emission reduction actions, aka Nationally Determined Contributions (NDCs) to limit global temperature rise to 1.5°C as pledged by all countries in the Paris Agreement.

RICH AGAINST POOR This is a dangerous failure – science requires almost halving greenhouse gas emissions by 2030 – but the implementation of current pledges of NDCs put the world on track for 2.5°C by the end of the century. The world is already experiencing the impacts of nearly 1.2°C of warming; the floods in Pakistan a fresh grim reminder of what awaits all countries in the future. And yet the COP Presidency could not push countries into upping their ambition or putting a realistic roadmap for a mitigation programme.

Instead, governments were requested to revisit and strengthen the 2030 targets in their national climate plans by the end of 2023, as well as accelerate efforts to phasedown unabated coal power and phase out inefficient fossil fuel subsidies. This is a joke, and actually shows the lack of political will in the developed countries to accept that oil and gas are also fossil fuels and there is no such thing as an efficient fossil fuel subsidy. After India raised the issue, there was initial support to the inclusion of all fossil fuels in the cover text, but oil-rich countries and their friends in the developed countries made sure the idea was shelved.

In another big fail, the COP was not able to come up with long-awaited answers to a question on every developing world delegate's lips as to how and when the developed world will start paying out the full 100 billion dollars per annum climate finance goal announced in Copenhagen in 2009.

FACING PAGE *There can be no climate justice without human rights and Indigenous Peoples' Rights was the main call of the People's Declaration for Climate Justice, which includes demands to decolonise economies and societies, repay climate debt, and address global warming by reducing emissions to zero by 2030.*

ABOVE *Disha Ravi with the youth delegates from Fridays for Future and other youth organisations at the Climate March. For the first time, youth were provided with a dedicated space at COP27 to host dialogues and discussions aimed at accelerating global climate action.*

The UNFCCC calculated that developing countries would need USD 5.6 trillion up to 2030 to fulfil even the current NDCs. Even the Sharm el-Sheikh Implementation Plan, the cover decision of COP27, clearly states that a global transformation to a low-carbon economy is expected to require investments of at least four to six trillion USD a year.

The failure of the rich and developed countries to come good on their promise is not only a matter of serious concern for the effectiveness of the COP presidency, it also raises doubts on the integrity of the announcement on Loss and Damage funds if countries are not willing to put their money where their mouth is.

BUSINESS AS USUAL Set against a difficult geopolitical backdrop, COP27 brought together more than 35,000 participants to share ideas and solutions, and build partnerships and coalitions. Indigenous peoples, local communities, cities and civil society, including youth and children, showcased how they are addressing climate change and shared how it impacts their lives.

Many of the ideas showcased in the country and NGO pavilions were about adaptation and building resilience to impacts of climate change, like restoring mangrove swamps and regrowing forests, measures that require funding that the poor countries do not have. Of the 100 billion dollars a year, rich countries promised they would receive only about 20 billion dollars, which would go towards adaptation. In Glasgow, countries had agreed to double that proportion, but at COP27 some sought to remove that commitment that was later reinserted in the final text thanks to a feisty pushback by developing countries.

No progress was made on forest protection at COP27 except for the launch of the Forest and Climate Leaders' Partnership, which aims to unite action by governments, businesses and community leaders to halt forest loss and land degradation by 2030. At COP26, more than 100 countries signed a declaration to end and reverse deforestation by 2030. The funding promises of almost 20 billion dollars toward forest conservation were equally ground-breaking. Last month, The Forest Declaration Platform released its latest progress report on the global goal of ending and reversing deforestation by 2030. It found that not one global indicator showed us to be on track toward these goals. The deforestation crisis has actually worsened. Deforestation in the Amazon, for example, increased by 48 per cent over 2021.

Another UNEP report shows that financial commitments needed to meet deforestation goals, known as the Green Gigaton Challenge, are way off track. The Green Gigaton Challenge aims to mobilise funding to reduce one gigaton of emissions from tropical deforestation by 2025, and a gigaton each year thereafter until 2030. The report revealed that less than a quarter of the finance needed to meet the goal has been mobilised to date.

"There will be no climate security if the Amazon isn't protected," said Lula da Silva, the incoming President of Brazil at a side event at COP27. Without giving details, he said his administration would work with the Congo and Indonesia, along with Brazil – home to the largest tropical forests in the world. Given the moniker "OPEC of the Forests," the general idea is for the three countries to coordinate their negotiating positions and practices on forest management and biodiversity protection. Lula also argued that the UN climate summit in 2025 should be based in the Amazon, so "people who defend the Amazon and defend the climate get to know the region close up."

TOP RIGHT *Debashish Kumar, MLA from Kolkata, announced the intention of making the city carbon-neutral at a Climate Action Network South Asia (CANSA) event during COP27.*

MIDDLE RIGHT *John Kerry, climate envoy of USA, is known as a rock star of climate diplomacy but has not been able to convince his own country, let alone others, to accelerate the phase out of all fossil fuels.*

BOTTOM RIGHT *On account of restrictions on freedom of association and assembly, and free speech imposed by the Egyptian government in the streets of Egypt, for the first time ever, the Climate Movement's Global Day of Action´s big march took place within the Blue Zone (governed by UN rules).*

WHERE DO WE GO FROM HERE? In another side event at COP27, the Mangrove Alliance for Climate (MAC) was launched on November 8. An initiative led by the United Arab Emirates (UAE) and Indonesia, MAC includes India, Sri Lanka, Australia, Japan, and Spain. The move, in line with India's goal to increase its carbon sinks, will see our country collaborating with Sri Lanka, Indonesia and other countries to preserve and restore the mangrove forests in the region. However, the intergovernmental alliance works on a voluntary basis and the parties will decide their own commitments and deadlines regarding planting and restoring mangroves.

All eyes are now on the upcoming COP15 UN Biodiversity Conference in December, some are dubbing it as a final opportunity for the world to turn the tide on nature loss, in support of climate action. In fact, the champions of the Paris Agreement have asked that leaders secure a global agreement for biodiversity which is as ambitious, science-based and comprehensive as the Paris Agreement is for climate change.

COP27 failed to deliver on people's expectations for swift and timely climate action at a time of poly-crisis. Its one success, the breakthrough Loss and Damage deal, was actually a no-brainer. If countries cannot mitigate, rest assured there is going to be loss and damage. Having a fund to help the worst affected is a good idea, but wouldn't it be better to reduce emissions and thereby reduce loss and damage as much as possible? Where is the money going to come from, anyway?

ROHAN BHATE (SHAH)

Bauxite Mining Threatens World Natural Heritage Sites in Maharashtra

By Rohan Bhate (Shah)

With rugged mountains, picturesque valleys and a myriad streams – all harbouring an extraordinary diversity of floral and faunal life, the Sahyadri Tiger Reserve is possibly one of India's least known tiger reserves. Though parts of the reserve – Koyna, Chandoli, Radhanagari and Sagareshwar, were protected since 1985, it was only in 2008 that the region received tiger reserve status, which included the Chandoli National Park (317.67 sq. km.) and the Koyna Wildlife Sanctuary (423.55 sq. km.). In Sanctuary's *Wild Maharashtra*, G. Sai Prakash reminisced about some of his fondest memories while exploring this reserve. He wrote, "If you walk the game trails in Koyna and Chandoli, you will discover that western (montane) subtropical hill forests thrive on the higher ridges above 1,000 m. with stunted and no distinct canopy. Interspersed are large grassy banks so vital to herbivores. This mix defines the Sahyadris and is the source of its exceptional biodiversity. On the lower slopes, dense, southern moist mixed-deciduous forests dominate and the deeper valleys are clothed by west coast semi-evergreen forests, with canopy heights varying from 12 to 20 m., populated by a bewildering variety of plants and animals. Of these, the tiger is undoubtedly the one that catches the most national attention, but the reserve is also blessed by leopards, Indian giant squirrels, mouse deer, pangolins, sloth bears, wild dogs, monitor lizards, pythons and even crocodiles in the Chandoli National Park."

Not surprisingly, the United Nations declared the Koyna and Radhanagari Wildlife Sanctuaries and the Chandoli National Park as World Heritage Sites.

Any government would be proud of such rich natural wealth and work toward safeguarding it. However, according to recent reports, the Maharashtra state government has written to the Central Government requesting the easing of norms of the Eco-

ROHAN BHATE (SHAH)

ABOVE *In 2008 the Sahyadri forests, encompassing the Chandoli National Park and Koyna Wildlife Sanctuary, received tiger reserve status.*

FACING PAGE *Exploration for bauxite mining in biodiverse mountainous plateaus seriously threatens the future of the Greater Sahyadri landscape.*

Sensitive Zone in the Western Ghats for exploring bauxite mineral deposits found in the forested mountain plateaus of Kolhapur district. The Department of Mines has estimated that Kolhapur district could contain around 113 million tonnes of bauxite reserves in its lateritic plateaus. Up to eight bauxite mining proposals are in the pipeline awaiting diversion of prime forest land. It is believed that the Central Government's Trust Advisory Committee may have given a green signal to these proposals by according Stage-I approvals.

Open cast bauxite mining on the proposed mountains threatens the unique floral and faunal biodiversity of *sadas* or plateaus here. Such mines are pollution-intensive, creating large amounts of waste. Overburden removal from mined areas causes a massive loss of forests and rich top soil. Excavation, top soil stacking and dumping of mine waste leads to land and water degradation, which impacts wildlife as well as local communities. Noise and air pollution from blasting, heavy machinery and vehicle movement will also affect the habitat and wild denizens therein. In particular, it will impede their free movement between the Radhanagari Wildlife Sanctuary and the Chandoli National Park. In fact, bauxite mining threatens the very classification of these World Heritage Sites, and UNESCO could potentially shift their status to 'red category'.

Scientific studies including camera trapping efforts have confirmed breeding populations of tigers here as well as the movement of tigers from the Kali Tiger Reserve (Anshi, Dandeli and Bhimgad) in Karnataka to the Radhanagari Wildlife Sanctuary and further northwards to Chandoli and Koyna. The proposed mining projects between the Radhanagari Wildlife Sanctuary and Chandoli National Park will impact age-old tiger migration routes. This 80 km. stretch between Radhanagari and Chandoli is now under the management of the Territorial Forest Department. The Government of Maharashtra had recently declared six Conservation Reserves (CR) namely Tillari, Amboli-Dodamarg, Vishalgad-Panahalgad, Ajara-Budhargad, Masai Pathar, and Jor-Jambhali. If the bauxite mining proposals are given a go ahead, all such classifications will mean little for the region.

Bauxite mining has been shown to cause habitat destruction, soil erosion, biodiversity loss and pollution. While mining for bauxite is not a new threat in western Maharashtra, where 33 bauxite mining projects have been in operation including 16 in Kolhapur, the new request for further exploration in the mountainous plateaus seriously threatens the efforts of locals, NGOs, administrators and conservationists to safeguard the Greater Sahyadri landscape. These forests are home to roughly one-third of all the plants, half of the reptiles and three-fourth of the amphibians found in India, many of which are endemic to this region. That is the true wealth of the state that the government should be protecting, not destroying.

Bauxite mining has been shown to cause habitat destruction, soil erosion, biodiversity loss and pollution.

ROUF AHMAD RATHER

CELEBRATING A RICH AVIAN HERITAGE

JAMMU & KASHMIR BIRD FESTIVAL

by Shatakshi Gawade and Francesca Cotta

Autumn made its graceful presence known in the shy incandescence of yellows and oranges in the chinars, the plumpening apples clearly visible through fenced orchards along the highway and in the crisp, cold air that gave a welcome respite from a hearty sun. We were an unconventional group of ornithologists, birders, conservationists and hospitality students, making our way towards the Pahalgam Club and Convention Centre for the inauguration of Jammu and Kashmir's (J&K) first ever bird festival, held on October 6-8, organised by the Department of Tourism, J&K in collaboration with the Sanctuary Nature Foundation (SNF), and supported by the Bombay Natural History Society (BNHS) and the Wildlife Conservation Fund (WCF), Pampore as partners.

The Sanctuary Nature Foundation has been working in the union territory for the past four decades and our readers are aware of how much we value the avian riches of both, Jammu and Kashmir. Launching a bird festival in this biodiversity-laden, geographically unique union territory has been an important agenda for us, for the past four or five years. With over 550 species of birds, many of which are rare or endemic to the region, it's a wonder that J&K had not had its own bird festival yet, when so many other states across the country regularly organise them. We are delighted to have had a part to play in changing that fact.

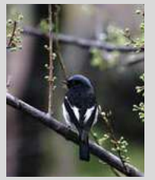
A GOLD MINE OF POTENTIAL For *Sanctuary*'s Founding Editor, Bittu Sahgal, the logic is crystal clear: J&K is undoubtedly among the best, and probably the least discovered, birding destinations in the world. As Dr. Asad Rahmani, ex-Director of the BNHS, said at the festival inauguration, "We are sitting on a gold mine." Without a shadow of doubt, avians are the most visible and attractive indicator species of the health of the ecosystems in which they live. The people who live closest to wildernesses are the ones who know it best. They also stand to benefit the most from activities that safeguard their forests – both in terms of well-being and livelihood. The idea in organising this festival was to bring some of the country's finest ornithologists and birders under the same roof – or canopy! – as J&K's youth, particularly those passionate about birding. The birding sessions, workshops and talks held at this year's event were just the beginning of what will be a long-term project of building capacity in the local youth to become trained bird and nature guides, so that they may generate an adequate income from doing this.

With this vision as the backbone of J&K's first bird festival, we were thrilled that the Department of Tourism, J&K, was a co-organiser. Dr. Deeba Khalid Peer, ensured full support from the Department of Tourism, Kashmir, to set a strong foundation for the J&K Bird Festival, 2022 as a vibrant platform for birdwatchers around the country.

Dr. Bivash Pandav, Director, BNHS, also echoed the opinion that the bird festival becomes a baseline initiative to improve the birding skills of local youth, particularly from rural areas. He pointed out that given how many people generate an income from taking people birdwatching, there would be a high demand for the same in J&K, which has a tremendous variety of birds. He hopes that in the future, that tourists come to Dachigam not just to see the black bear and hangul but also for the 40-50 species of birds they can encounter there.

Another motivation for organising this festival is to promote lesser-known birding hotspots, such as in Jammu – where Sanctuary plans to do a bird festival in the near future – and Dara, adjacent to Dachigam, in whose valleys there is potential to bring similar forests back.

SETTING HOPEFUL INTENTIONS The inaugural event, held at the Pahalgam Convention Centre along the sparkling, glacial Lidder river, helped us orient ourselves within the intentions for the festival. In his opening address to the audience, Sarmad Hafeez, Secretary of Tourism, Government of J&K said, "This festival will help invite people from across the country and the world to visit our beautiful region for birdwatching and nature." The collaboration between the Department of Tourism and SNF was officiated in the signing of a memorandum of understanding between the two. Later, Dr. Asad Rahmani gave an insightful presentation on the birds of Kashmir, and stressed upon the importance of using such festivals as platforms to raise awareness on the conservation issues faced by the region's most vulnerable Important Bird Areas (IBAs). He spoke about how many of Kashmir's wetlands were in important need of attention and should come under the purview of future festivals.



Mohammad Ayoub Nayiak and Aijaz Ul Gani: The young men who trekked 40 km. to reach the Bird Festival!

Ayoub, an agriculture assistant manager, and Aijaz, his cousin, walked for a day for over 40 km. to reach the Bird Festival, all for their love of birding. "We walked so that we could explore the landscape and birds along the route," Ayoub shared. Their route brought them from their village Reasi, Jammu district via Gulabgarh, Nikan, Zajimarg, Nandimarg, Damal Hanjipura and Kulgam to Pahalgam. Ayoub is an avid birder. He shared that he is the second person to have recorded the presence of the Dark-side Bush Warbler, in 2019; the first record was in 1971! "I was introduced to birding by my college professor. Nadeem Qadri (Founder, WCF) who has constantly motivated me to continue birding," said Ayoub. During their long trek to reach the Bird Festival, Ayoub and Aijaz spotted the Himalayan Monal and Blue Rock Thrush, among a host of other birds and butterflies.

Parvaiz Yousuf: a lifelong birder with a passion for learning

Parvaiz has completed his Masters in Zoology from the Central University of Kashmir and is currently applying for a Ph.D. He says birding is a hobby, one he is passionate about and glad to be able to do anywhere he goes. He was one of the WCF volunteers, who helped in many aspects of putting together the festival. For him, the highlight of the event was meeting different experts and getting more birding experience from them.

Parvaiz has loved birds all his life. His home is just a hop, skip and jump away from the bank of the Chatlam Wetland Reserve. As a child, whenever I would open a window in my house, he would see a variety of birds. As he grew older, he met some expert birders and became curious about the activity. By 2020, already a birder, he attended a Green Skill Development programme organised by the Central Ministry, which helped him improve his understanding of the basics.

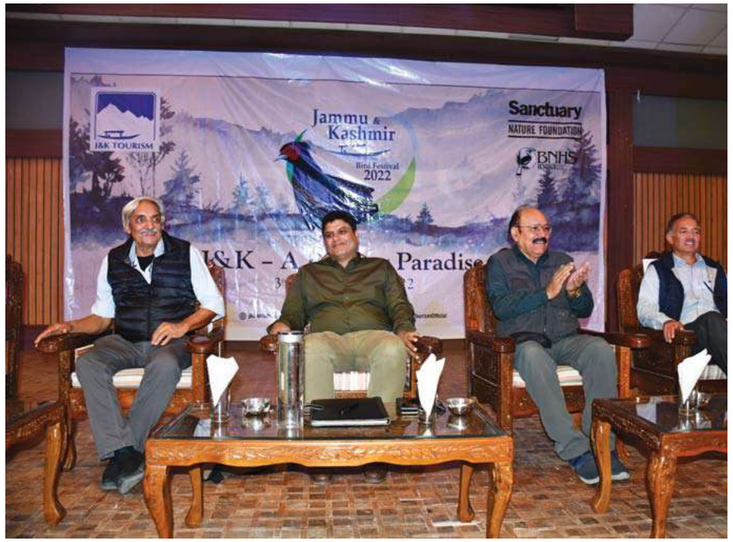
Always keen to learn new things, visit new places and find new birds, Parvaiz is pleased to have seen rare species such as Orange Bullfinch, bramblings, Yellowhammer, Tawny Owl, Kashmir Nutcracker and Kashmir Nuthatch – only found in J&K.

In the future, he hopes that many youth will visit these birding hotspots in the union territory, and learn more about birds. He is keen to share their knowledge with them, and introduce them to the hundreds of bird species found in Jammu, Kashmir and Ladakh. He also really wants that the four wetlands of Pampore to be declared as Ramsar sites, as they fulfill all the criteria.

EARLY BIRDS The second and third days of the festival happily began with a morning bird walk. The first one was at the Overa Aru Wildlife Sanctuary, named after the neighbouring village and stream. Intesar Sohail, Wildlife Warden, Shopian and co-founder of Kashmir Birdwatch, shared that the sanctuary was earlier a game reserve for royalty, mainly for the endemic hangul. A wooden cabin at the entry of the sanctuary

FACING PAGE *Jammu and Kashmir offers over 550 avian species for birders to test their patience and skill including beautifully camouflaged birds like this Tawny Owl* Strix aluco.

COURTESY DR. BILAL NASIR ZARGAR



COURTESY DR. BILAL NASIR ZARGAR

TOP LEFT *The Chief Guest Sarmad Hafeez, Secretary of Tourism, was joined on stage by other dignitaries such as Dr. Asad Rahmani, conservationist and former Director of BNHS, Bittu Sahgal, Founder of Sanctuary Nature Foundation, and Farooq Gillani, retired additional principal Chief Conservator of Forests (Kashmir).*

BOTTOM LEFT *As part of the J&K Bird Festival 2022, participants hiked in the Overa-Aru Wildlife Sanctuary for an early morning birdwatching session with experienced birdwatchers and photographers. Dr. Asad Rahmani, highlighted an unusual fact about the forest – eight species of warblers breed in the Overa Aru Wildlife Sanctuary, making it important scientifically, and truly a birdwatchers' heaven.*

now functions as a pitstop for hikers. Dr. Rahmani highlighted an unusual fact about the forest – eight species of sympatric warblers breed in the sanctuary, only the second other place in the world where this happens. Some of the rarer birds that also breed here are the Kashmir Flycatcher and the Ibisbil. Perhaps rarer than the birds sighted that morning was the presence of so many skilled and seasoned birders in one place! They formed a veritable 'parliament of pros', and the other attendees thoroughly enjoyed the chance to watch and listen to them spot and correctly identify birds, and share their natural history details.

As we walked, every now and then, we would hear the call of a bird or see a flutter of its wings and the group would slow its pace and tread more quietly than before. Binoculars would be held up, sometimes passed around, camera lenses focused, and the occasional excited murmur would float through the crisp air as one human or the other in our group had their first encounter with a particular species of bird. Dr. Parvish Pandya, SNF shared precious information about bird adaptations and behaviour, while Saurabh Sawant, SNF rattled off the names of species seen with their habitat preferences and conservation.

By the end of our morning, we had spotted or heard the Slaty Blue flycatcher, Himalayan Woodpecker, Lemon-rumped Warbler, Coal Tit, Yellow-billed Blue Magpie, Little Forktail, White-capped Water Redstart, Brown Dipper, Himalayan Bluetail, Plumbeous Water Redstart, Cinereous Tit, Bar-tailed Treecreeper, Whistler's Warbler, Grey Bushchat, Large-billed Crow, Black-eared Kite, Blue Whistling Thrush and Spotted Forktail. Back at the wooden lodge at the entrance of the sanctuary, with the mid-morning sun warming our backs, we sipped on cups of hot *kahwa* at the former hunting lodge, chattering as merrily as the birds in the forest.

The next morning, the group went to Pampore to see the wetland birds, along with students from Satisar Educational Institute, a school in the area. As we shuffled past what looked like barren fields, we began to notice tiny flashes of purple poking through the soil at some points – early blooming saffron flowers! Pampore has four wetlands – Fashkoori, Chatlam, Kranchu and Mainbug. They form an interconnected complex, which supports a rich variety of resident and migratory bird life of at least 137 species. That day, we spotted mallards, the Common Moorhen, Common Coot, Grey-headed Swamphen, Common Kingfisher, White-breasted Kingfisher, Little Grebe, House Sparrow, Common Myna and Grey Wagtail.

COURTESY DR. BILAL NASIR ZARGAR

PARVEZ SHAGOO

LEFT *Spotted Forktail* Enicurus maculatus. *RIGHT Lemon-rumped Warbler* Phylloscopus chloronotus.

J&K has over 3,000 wetlands, but these nutrient-rich ecosystems are threatened on account of anthropogenic pressures such as dumping of polluted water and solid waste. Advocate Nadeem Qadri and his dedicated band of volunteers from WCF, have been working tirelessly on raising awareness in the community that lives around the Pampore wetlands and helped work behind the scenes to make the bird festival possible.

The day's events also included a photo exhibition of the birds of Kashmir, set up near the Chatlam Wetland, and was attended by local school students, along with the Forest Department, Fisheries Department, Wildlife Department, team members of SNF and BNHS, experienced birders and photographers, and various volunteers of WCF. Bittu Sahgal also addressed the frontline staff of the Forest Department and commended them for their efforts in protecting the wetlands.

Professor G.M. Bhat, a geology expert and Chief Advisor, The Nature University, Pampore spoke poetically of these rich habitats, "The wetlands of Pampore tehsil are a time capsule – the sediments under these wetlands are a repository of the climate history of thousands of years. They are a sinkhole for carbon dioxide and home to a variety of bird species. We need to preserve and protect these wetlands."

TRANSFERRING KNOWLEDGE Some of the most valuable interactions between young festival volunteers and attendees from J&K and some of the finest birders and ornithologists in the country took place on the second day.

The BNHS' Dr. Madhumita Panigrahi and Dr. Mrugank Prabhu gave a detailed presentation on the process of bird ringing for research purposes, along with a display of different equipment such as pliers, rings and nets. They spoke of the precautions needed during ringing and the different methods that can be used. We listened in fascination to her insights about the different temperaments of birds, and what one may expect while ringing them. We laughed when Dr. Panigrahi told us that Ruddy Shelducks are strong and can drag you while being ringed, but began to wince when she spoke about Shrikes – known as butchers – that can dig into your skin and pull a chunk of it out. They ended their talk by explaining how bird photographers could share information with the BNHS of ringed birds they spot, explaining that data collected through ringing can be used to study various aspects of birdlife. These links established between hardcore scientists and citizen scientists are precisely the reason why events like this bird festival are much needed!

Megh Roy Choudhury, a brilliant wildlife photographer and a Canon EOS Explorer also conducted a spirited presentation on 'How to be a better wildlife photographer'. She spoke of photographing for the love of wildlife and nature and not for social media. Through various examples of her own stunning images, she generously shared the techniques she uses to make images, and shared many tips with photographers and birders on how to get the best images while not disturbing wildlife. She spoke about how photography should not just be for photography's sake, but should be used for conservation.

This first edition of the J&K Bird Festival laid the foundation for what will be an annual event where expert ornithologists from within J&K and other parts of the country, meet and interact with keen birders and nature lovers, and share their experience and expertise with them. The idea is for new vistas for birding, trekking and camping to open up in the union territory, at the intersection of conservation, hospitality and education.

We parted ways after an invigorating three days, certain that we had only just begun to scratch the surface of this abundant avian paradise.

The Sanctuary Wildlife Photography Awards 2022

Editor's Choice

Night Watch

On the outskirts of the Corbett Tiger Reserve, close to village Jamoon, I came across a sambar carcass during one of my regular field trips in the area. It had possibly been killed by one of the many resident tigers of the park, consumed and its remains left to rot – its flesh softening over time. Guessing that an opportunistic feeder might be drawn towards the big carcass, I set up a camera trap near it. I used a wide-angle lens and set it up in a camouflaged metal structure. I also decided to light the scene using two Nikon flashes triggered by a transmitter and receivers, placing the transmitter atop the camera and the receivers attached to the flashes and added a Camtraptions PIR sensor (passive infrared sensor). Any movement in front of the trigger point, such as an animal passing in front of the sensor, would result in the flash firing and the camera capturing a photo.

After the setup, I camouflaged the camera trap using branches and leaves and visited the site after three days. To my surprise, not one but two small Indian civets *Viverricula indica* had been captured feeding on the carcass. These small mammals, native to South and Southeast Asia, are often mistaken to be a type of wild cat. They are nocturnal creatures and often scavenge on leftovers from the meals of larger predators. Although generally solitary, they form pairs for mating and hunting.

PHOTOGRAPHER: Mayuresh Kishor Hendre
LOCATION: Corbett Tiger Reserve, Uttarakhand
DETAILS: Camera: Nikon D810,
Lens: Samyang 14 mm. f/2.8 lens, Aperture: f/13,
Shutter speed: 1/250 sec., ISO: 800, Focal length: 14 mm.
DATE AND TIME: February 11, 2022, 7:27 p.m.

DR. K. S. SESHADRI

THE SPECIAL, SPATIAL LIVES OF AMPHIBIANS

By Deyatima Ghosh and Neelavar Ananthram Aravind

Frogs are proficient in using egocentric (right turn/left turn), visual, and spatial cues. Animals have a 'map' of their surroundings, which allows them to select the correct route while navigating.

TINY FOREST PATHWAYS On a rainy night in the dense evergreen forests of Sirsi in the Western Ghats, my team and I (Deyatima) were engrossed in tracing a blue-eyed yellow bush frog's call, when we were distracted by an unfamiliar call. Curious, we followed the source and came upon two frogs sitting in close proximity, about a foot above the ground. Chances were, this was either a male and female, or two males. However, it was rare to find two males in the same tree that close and not engaged in a tussle. Further investigation revealed a cluster of tiny eggs glued to a leaf few inches above the "parent" frogs. Evidently, they were guarding their eggs against the owner of the unfamiliar call, which came from the same species as the pair. I wondered how these tiny frogs were not lost or confused, because we were in a complex habitat with dense, evergreen trees that made it difficult even for our research team to locate previously identified study sites at night.

Frogs are proficient in using egocentric (right turn/left turn), visual, and spatial cues. Edward Tolman in 1948 first explained that animals have a 'map' of their surroundings, which allows them to select the correct route while navigating. Most of the tasks performed by animals in the wild such as mate choices, foraging, and escaping from predators, include learning about their physical environment, and can be collectively grouped under 'spatial learning'. Learning about one's immediate environment

requires associating some features with conspicuous cues and memorising them to navigate back to the correct place (a territory or a brooding site). Whatever the underlying mechanism, pathfinding entails spatial learning.

HOW AMPHIBIANS NAVIGATE SPACE Amphibians show surprising navigational skills while parenting, in which either or both the parents invest in post-mating activities such as guarding eggs, tadpoles or young ones. In amphibians, females exercise mate choice, therefore sexual pressure is mostly exerted on males. This often results in males showing territoriality and parental care and playing the role of 'Mr. Mom'. Such selection can influence an animal's ability to learn and remember information flexibly.

Parental Care in Amphibians

Kentwood D. Wells in his book *The Ecology and Behaviour of Amphibians* describes eight parental caring acts – egg attendance, egg transport, egg brooding, tadpole attendance, tadpole transport, tadpole brooding, tadpole feeding, and froglet transport. Apart from these, there is also evidence of nest-building in some species.

Parental care is widespread in amphibians and is seen in 22 of 55 families and roughly 10 to 20 per cent of all species. Some frogs demonstrating parental care include poison dart frogs *Dendrobatidae* in Central and South America, common coquí *Eleutherodactylus coqui* in Puerto Rico, Microhylid frogs in Papua New Guinea, Aromobatid frogs in Peru and French Guiana, La Palma glass frog *Hyalinobatrachium valerioi* in Costa Rica, *Rohanixalus hansenae* in Thailand and night frogs *Nyctibatrachus sp*. in India. Male night frogs *Nyctibatrachus kumbara,* endemic to the Western Ghats, stand on their hind legs and pack mud on the laid eggs to keep them moist and camouflaged from potential predators. Tree frogs *Rachophorus sp*. make foam nests and protect their tadpoles after the female departs. The male bubble-nest frog *Raorchestes chalazodes* has been observed near bamboo reeds. They enter the bamboo through a small slit to cater to their offspring while evading the predator's vision. Females of most of these species mate and deposit eggs within male territory and desert them soon after.

India, especially the Western Ghats, has the maximum diversity of frogs, most of which are understudied. Given this diversity, there are reports of various forms of parental care including territoriality, nest-building to nurture offspring, egg protection from predation or desiccation, guarding the tadpoles and eggs, and more. However, tadpole transport has not yet been described for any species. Nevertheless, spatial learning is present in every frog species, and they exhibit it in myriad ecological contexts.

DIFFERING NEEDS Females require spatial learning mostly to return to the best males, while comparing potential mates from a selection of competitors engaged in a display. Females move from one male to the other as they are polyandrous (able to mate with more than one male), while males

ANGAD ACHAPPA/SANCTUARY PHOTOLIBRARY

ABOVE *Blue-eyed yellow bush frogs, endemic to the Western Ghats, have been recorded only from the state of Karnataka.*

FACING PAGE *Mud-packing behaviour displayed by the Kumbara night frog is a unique behavioral aspect, unrecorded in any other frog species in the world. Males dab mud and sand on the laid eggs to to prevent their predation and dessication.* Nyctibatrachus kumbara*, comes from the word* kumbar *in Kannada, which means potter, a person who shapes mud into pots.*

are more territorial. The part of an amphibian's brain known as the mammalian hippocampal homolog is active during the period of parental care, and it is associated with learning and memory. On my field survey in the Western Ghats, I was surprised to find blue-eyed yellow bush male frogs in the same tree for five consecutive days, one male per tree. These trees were possibly ideal locations to call for females. Additionally, if any of the males had a female with it, the pair would be found together in the same tree the next day as well. This is an admirable demonstration of the extremely detailed map they form of their habitat, in this case the tree where they would raise their offspring in the near future.

Males can return from distances of almost 800 m. when they are displaced from their home territory, following a direct path with high orientation accuracy. This ability comes with experience i.e. familiarity with cues around their home range. Thus, frogs navigate using a 'spatial map'. Males of Savage's Cochran frog *Centrolene savage* have a higher tendency to return home to care for their babies rather than unmated males. Finding their way

Amphibians show surprising navigational skills while parenting, in which either or both the parents invest in post-mating activities such as guarding eggs, tadpoles or young ones.

PUBLIC DOMAIN/POOJA RATHOD

ABOVE *The Western Ghats evergreen landscape has unique bioclimatic conditions and geography, which have given rise to an astounding diversity of amphibians and reptiles. The continued discovery of new species from this landscape highlights the need for urgent conservation measures.*

back is also related to finding their own territory, including ‘calling sites’ that ensure female attention. After tadpoles hatch in terrestrial microhabitats such as leaf litter, male poison dart frogs carry their babies on their backs and transport them to temporary water pools to deposit them. Fathers do this without prospecting the surrounding because they rely on their spatial memory and experience of the pool location. They can remember and identify up to six deposition pools, using place cues. They can differentiate their own tadpoles from others based on spatial location. A study in 2017, led by Kristina B. Beck, a postdoctoral researcher at the University of Oxford, found father frogs to be stationary near pools that were removed recently. While in 2016, Andrius Pašukonis, Senior Researcher at Vilnius University, and his team observed male frogs revisiting pools even after two months after they were removed. This confirms the presence of spatial memory.

Father frogs who have to transport their tadpoles safely to a pool need to be well informed about the nature of the deposition sites; these pools need to provide hydration long enough for the tadpoles to develop while being ephemeral enough to avoid predators. Such precise judgement each time they travel to deposit their babies indicate they are capable of recognising some positional cues near the deposition sites. What they actually do is create a navigation map by integrating the olfactory, visual, acoustic, and magnetic cues. These are referred to as ‘sketch maps’. More time to travel and explore pools can dehydrate the tadpoles or attract predators, and they also run the risk of losing their own territory if kept unattended for long. Referring to the roadmap helps in accomplishing the task efficiently and is less time-consuming. Quickly relocating to an already familiar pond is the best strategy that improves the reproductive fitness of the species. They can even learn, unlearn and relearn spatial cues. Learning and acquiring information while traveling makes decision-making more reliable. Male frogs might be updating their knowledge about their area while traveling and returning home during tadpole transport. When the distance is further, fathers carry more tadpoles per trip to reduce travel time – somehow, they even anticipate the travel distance. Such spatial knowledge in due course of time can lead to stronger selection for spatial memory and improve flexibility for more efficient detours. The cognitive faculties used by amphibians include vision and olfaction. In an experiment conducted by the University of Vienna, parent frogs displayed highly oriented movement that brought them to suspended buckets with tadpoles from a distance of 10 km. While in another study with the Zimmermann’s poison frog *Ranitomeya variabilis*, frogs avoided depositing offspring with cannibalistic conspecific tadpoles based on olfaction. However, learning is not that easy. The time and energy spent on exploration can be costly

Amphibian males can return from distances of almost 800 m. when they are displaced from their home territory. This ability comes with experience – familiarity with cues around their home range.

JASON BROWN

DR. K. S. SESHADRI

PUBLIC DOMAIN/JOHN P. CLARE

ABOVE *and* TOP LEFT *Male poison dart frogs carry tadpoles on their backs and transport them to temporary water pools to deposit them. When the distance is further away, fathers carry more tadpoles per trip to reduce travel time – somehow, they even anticipate the travel distance.*

TOP RIGHT *Bubble nest frogs prefer the endemic bamboo Ochlandre travancorica to lay their eggs. A male frog is observed guarding eggs inside the hollow of the bamboo stem.*

in that it affects other fitness-related activities such as territory defence, advertising for mates, and exposes amphibians to sit-and-wait predators.

MORE UNIQUE STRATEGIES The Indian bubble-nest frog has another interesting strategy. Unlike poison dart frogs, a father bubble-nest frog does not desert the babies after they are translocated to a suitable pond. Rather, they continue guarding their tadpoles. Their breeding site is also unique – a hollow internode bamboo. Fathers are very particular about their brooding sites; the bamboo they select (*Ochlandra travancorica*) for the eggs are endemic to the Western Ghats. We have no information about why these fathers only choose endemic bamboos, or how they assess their quality as a home for their offspring. Further, they look for bamboos with a small slit, so small and thin that it is nearly impossible to believe it is used as a pathway! Father frogs squeeze their bodies through the slit with extreme agility to attend to the eggs. What spatial cues allow the father frog to select such breeding sites and how this father remembers which bamboo shoot to return to in a dense and diversely vegetated patch is no less than a mystery. We also have no idea how many such dedicated frog parents are doing their daily chores to ensure the survival of their species.

The deeper I venture into forests, the more I am amazed by the innumerable instances of animal intelligence in nature, and amphibians are only one such example. They show fantastic evidence of the evolution of the forebrain, and the related complex cognition that was necessary for a transition from aquatic to terrestrial life.

The discovery that small animals like frogs have a spatial understanding of their surroundings should make us ponder the implications. Tropical regions like India and other neotropical regions are rich in amphibian diversity and are also threatened by rapid habitat transformation. Many Indian species of amphibians display parental care. Since parenting influences offspring survival and reproduction, parental decisions often impact reproductive success and population dynamics. What happens to their cognitive abilities with the rising threats from deforestation and habitat loss? How does that impact or improve cognitive maps and how can that eventually impact population dynamics? Updating our knowledge about the cognitive cues they use to navigate, select breeding sites, tadpole deposition pools, and to make many other such decisions can help in crafting better conservation action plans.

I am certain of one thing: there is still so much more we need to explore to unravel the secret lives of amphibians.

Deyatima Ghosh is a postdoctoral researcher at Ashoka Trust for Research in Ecology and the Environment (ATREE), Bengaluru, and is currently working on cold blooded cognition.
Neelavar Ananthram Aravind is an ATREE Fellow who uses tools such as molecular, ecological, phylogenetics, and ENM to address both basic and applied research questions.

Rainbow *in the* Night Sky

The Sanctuary Wildlife Photography Awards 2022

Certificate of Merit

These waves of magnificently coloured spots, juxtaposed against the starry night sky, are actually spores released by fungi! Meanwhile, a snail of *Succinea sps*. slides along nonchalantly on the dead log, feasting on the fungi.

Fungi, single-celled or multicellular eukaryotic organisms, are present all around us – in the soil, air, water, in and on plants and animals, in food, and even in the human body. They play a critical role in nutrient recycling by breaking down matter and returning carbon, nitrogen, oxygen and phosphorus to the atmosphere and soil.

Fungi release spores either actively or passively. They do so actively by forcefully ejecting the tiny reproductive units from their body. Gravity carries the little spores to the ground, from where they are consumed by animals and deposited elsewhere through their dropping. Some simply grow into new fungi right where they fell. For passive spore release, fungi rely on external agents such as insects, wind and water, including rain. Fungal spores are of varying sizes – some can be as small as two micrometres, especially those dispersed by the wind.

Spores are actually brown, white, black or pink in colour. To capture this vivid image, the photographer fired an intense flash from the opposite side to flush out spore colours and details. He created this exquisite image between gusts of wind, ensuring that the swirling spores and the night sky filled the background behind the snail.

Along with plants, animal matter and soil, fungi are an important part of a snail's diet. Intriguingly, some species of snail actually farm fungus! Along the east coast of North America, seaside snails, marsh periwinkle *Littoraria irrorate*, chew grass to wound it, defecate on it to add fertiliser, and return to the blade to feast on the fungus that consequently grows there. Insects such as termites and ants also farm fungi. Turns out, humans aren't the only farmers on Earth.

Here, in this moment, the ingenuity of the human mind, the beauty of our natural world, and the fantastic capacity of technology meld together to form this vibrant image. For his creativity, Prathamesh Ghadekar's entry in the Sanctuary Photography Awards 2022 received a Certificate of Merit.

PHOTOGRAPHER: Prathamesh Ghadekar
LOCATION: Shahpur, Thane, Maharashtra
DETAILS: Camera: Canon EOS 5D Mark III, Lens: Canon 100 mm. f/2.8 Macro Lens, Aperture: f/32, Shutter speed: 1/100 sec., ISO: 500, Focal length: 100 mm.
DATE: August 25, 2021

RAVINDRA NATH TRIPATHI

HAIDERPUR:

A Paradise Along the Mighty Ganga




By Manisha Bisht, Rounak Patra, Sipu Kumar and Amit Kumar

The sun shone bright on a chilly winter morning as we walked briskly past a wooden sign swaying in the breeze. We were entering the Haiderpur wetland. Excited by what lay ahead – a panoramic view of lush green vegetation, birdsong and an undulating gleaming waterbody, we felt that we were privy to a little-known emerald secret of the Ganges. Since the dawn of history, the mighty river has been sacred to the people of the sub-continent. Originating from Gaumukh, at the base of the Gangotri glacier and coursing its way across several northern states of India to finally surrendering itself to the Bay of Bengal, the Ganges has shaped large floodplains, including major wetlands and deltas. As the river crafted its path, it gave rise to habitats that supported an abundance of flora and fauna. With a drainage area of 862,796 sq. km., the Ganges is home to more than a hundred floodplain wetlands, that are considered some of the most fertile regions in India.

Haiderpur, one of the largest of these floodplain wetlands took shape after the formation of the Bijnor Barrage in 1984. We had the opportunity to explore this magnificent self-sustained, backwater-recharged wetland between 2020 and 2021. Though the wetland stretches over an area of 30,000 acres with a core area of 12,000 acres forming a part of Hastinapur Wildlife Sanctuary, a cursory view from the barrage, does little to intrigue the visitor. Perhaps it is this uninspiring shape that has concealed it from human greed. Nevertheless, as one begins exploring the wetland, its wonders only increase. A diversity of habitats ranging from deep upstream reservoirs to shallow flooded lands, islands and river stretches, Haiderpur offers sustenance and shelter to varied aquatic and terrestrial flora and fauna, supporting more than 20,000 birds from 300 avian species every year including the Lesser-Whistling Duck, Bronze-winged Jacana and Sarus Crane and species such as the swamp deer and gharial. Amidst large trees that grow along the mighty river, are shrubs, herbs and several species of grasses, reeds and sedges. The waterscape includes aquatic floating, aquatic submerged, roadside, islands and riverbanks that harbour one or more species of *Typha, Phragmites, Saccharum*, *Ipomoea, Nelumbo, Nymphaea, Eurayle*, *Pistia* and *Eichhornia*. This wetland, recently nominated as a Ramsar Site, is known to locals as the 'Barrage Wali Jheel' and is undoubtedly a textbook description of the northern Gangetic plains portrayed in Hindi folklore.

EXPLORING HAIDERPUR As we moved past the entrance, we discovered that the area has a 15 km. long trail with observatory huts at every half kilometre. Visitors can rent a bicycle and ride along the entire trail. A shorter trail that ends in a double-storied watchtower – an ultimate vantage point, which offers a view of a majority of the wetland, is also an option. From the watchtower, we watched the wetland filled with the cacophony of Eurasian Coot, with diving Dabchicks in the middle and a huge congregation of Greylag Geese. The wetland's peripheries were wreathed with water hyacinth where Grey-headed Swamphens and Egrets hunted for food. A Large-billed Crow circumnavigated the watchtower, showing its displeasure by calling raucously, possibly irked by human presence.

When we repositioned our binoculars, we were fortunate to see a herd of swamp deer moving in a relaxed fashion, grazing through the wetland. The state animal of Uttar Pradesh, and confined to the Indian subcontinent, it is listed as 'Vulnerable' in the IUCN Red List, with just three sub-species existing and populations completely wiped out from Pakistan and Bangladesh. A handful inhabit the stretches of Terai floodplains, Central India and Northeastern India. The Haiderpur wetland is one of those few places outside Protected Areas in India that supports a healthy swamp deer population. Commonly referred to as 'barasingha', ('twelve-tined') these niche-specific megaherbivores are obligate grassland-dwelling organisms. While these cervids are excellent ecosystem managers with their ability for effective seed dispersal and nutrient recycling within grasslands and wetlands, the hunting of these herbivores for their antlers, meat and skin, followed by the degradation and fragmentation of tall grassland habitats such as Haiderpur, are some of the many threats they face. Their unique habitat requirement and slow birth rate further add to their woes. This makes them a high priority species for conservation in areas like Haiderpur, where efforts towards their protection are still in the preliminary phase. While a small part of the wetland does come under the jurisdiction of the Hastinapur Wildlife Sanctuary, most of the area is still not secure.

Haiderpur is one of the largest floodplain wetlands of the Ganges that resulted after the construction of the Bijnor Barrage in 1984.

SWAROOP SINGHA ROY

ABOVE *A Sarus Crane* Grus antigone *pair near an agricultural field adjacent to the Haiderpur wetland.*

FACING PAGE *Haiderpur offers sustenance and shelter to varied aquatic and terrestrial flora and fauna, supporting more than 20,000 birds from 300 avian species and species such as the swamp deer* Rucervus duvaucelii.

AMIT KUMAR

ABOVE *With agricultural lands expanding closer and closer to the Haiderpur wetland, grazing and other human interference in the form of egg theft and hunting pose a significant threat here.*

SURVEYING THE WETLAND

During our village surveys, while wandering through agricultural land, a pair of Sarus Cranes enthralled us. The cranes, known for their fidelity and exquisite courtship behaviour, which includes trumpeting calls and wing displays, seemed unaware of our presence and continued feeding.

As with the swamp deer, Sarus Cranes are another niche specific species that largely prefer agricultural lands around wetlands for their survival and breeding. With global populations decreasing at an alarming rate, making the species 'Vulnerable', wetlands such as Haiderpur could play a major role in their conservation. However, with agricultural lands expanding closer and closer to the wetland, human interference in the form of egg theft and hunting pose a significant threat here.

During our surveys in and around the wetland, we recorded varied mammals, reptiles and amphibians and of course rich avian life. This included the Indian golden jackals, Indian rock pythons, otters and turtles. A staggering number of Greylag Geese possibly one of the largest congregations in the country, followed by Knob-billed Ducks *Sarkidiornis melanotos* and other groups of Anatidae kept us enthralled. With winter migration at its peak, the insectivorous Citrine Wagtails *Motacilla citreola*, were seen in large numbers. Bar-headed Geese *Anser indicus*, the world's highest-flying birds, were abundant. On foggy days, despite being well-equipped with gadgets and high enthusiasm, we failed to locate any birds and shifted our timings of bird surveys to afternoons. Accordingly, a slight shift in sightings was evident, with more active Woolly-necked Storks *Ciconia episcopus* and Black-headed Ibises *Threskiornis melanocephalus* being spotted. Raptors such as the Greater Spotted Eagle *Clanga clanga* and Eurasian Marsh Harrier *Circus aeruginosus* were seen soaring over the wetland. From common wetland birds like sandpipers, jacanas and swamphens foraging near the shallow waterbodies to migratory waterbirds including Northern Shovelers *Spatula clypeata*, Northern Pintails *Anas acuta* and Green-Winged Teals *Anas crecca*, we were elated by the wetland's capacity to sustain such a wide range of avifauna.

Swamp deer are endangered, making them a high-priority species for protection in some of the few wetland areas it is found in like Haiderpur.

From the sight of over 200 Red-crested Pochard *Netta rufina* roosting on sand bars, to watching the peculiar feeding behaviour of Common Pochards *Aythya farina*, Ferruginous Duck *Aythya nyroca*, and Painted Storks *Mycteria leucocephala*, life in the wetlands was full of learning and new experiences. Threatened species including the Black-bellied Tern *Sterna acuticauda*, Indian Grassbird *Graminicola bengalensis* and Eurasian Curlew *Numenius arquata* were important observations that further proves the importance of this wetland. Furthermore, several encounters with Asian water monitors, snakes and other reptiles kept our adrenaline pumped during our regular field survey.

TIMELY INTERVENTIONS

Despite sustaining such varied flora and fauna, the Haiderpur wetland was neglected for a long period before the Forest Department, under the joint jurisdiction of the Muzzafarnagar and Bijnor forest divisions, brought it under wing. In the past, the unsustainable collection of grass and reed as fodder by locals hampered growth and timely regeneration. Excessive livestock grazing, encroachment of the marshlands for commercial cultivation of *Trapa natans*, growth of invasive species (water hyacinth *Eichhornia crassipes*, water cabbage *Pistia stratiotes*, pink morning glory *Ipomoea carnea* and alligator weed *Alternanthera philoxeroides*) all posed a substantial threat towards prime waterfowl habitat. Bordered by nine villages, the wetland area popularly known as *jheel*, was used for fishing by locals. Turtles and waterfowls often got entangled in fishing nets, which were sometimes discarded as waste. However, since 2019, the active involvement of the respective forest divisions, government authorities, and NGOs such as WWF-India, individual efforts and mass awareness programmes led by birdwatchers and naturalists have led to the area being under surveillance and receiving necessary protection. While illegal fishing, wildlife poaching, unregulated resource consumption, and brewing of illegal alcohol are still rampant, the most serious threats remain expansion of the agricultural area, fragmentation of the wetland, as well as use of pesticides and fertilisers. Forest officials are working to minimise these threats with adequate management measures such as social awareness, providing alternative livelihoods to the locals, enhancing citizen science activity, removal of weeds via mechanical machines, and joint patrolling. With the introduction of e-rickshaw, natural trails and watch huts, the respective Forest Departments have been working diligently to monitor the wetland area by creating and updating checklists of faunal diversity with the support of local naturalists.

To understand the perspective of the villagers, we further visited wetland-dependent villages to undertake socio-economic surveys on their livelihood dependence and how declaring the wetland as a Protected Area or a Ramsar Site can potentially affect their livelihood. On interacting with local inhabitants, we received mixed responses; with some community members comprising fishermen and wood collectors expressing unhappiness about few initiatives. Local NGOs and Forest Departments are trying to solve their grievances through various alternate livelihood programmes and trainings, including skill-building to be a tourist guide, boat safari operator, sewing and handicraft, technical work, and through organising bird festivals and Wetland Day celebrations. However, the government's intervention for enforcement of control over land encroachment, extensive fishing, unregulated agricultural practices, and water pollution is urgently required for the protection of faunal diversity.

Haiderpur is a wetland of paramount importance that has sheltered swamp deer, Sarus Cranes, Black-bellied Terns, and more species. It requires our attention and care and our promise that we will safeguard this wild haven for posterity.

TOP RIGHT *A Pheasant-Tailed Jacana* Hydrophasianus chirurgus *on* Trapa nutans*, a commercial crop grown around the Haiderpur wetland.*

BOTTOM RIGHT *Mechanical removal of* Eichhornia crassipes *by the Muzaffarnagar Forest Department.*

ARINDAM BHATTACHARYA

AMIT KUMAR

Manisha Bisht is passionate about birds and their behaviour and has worked at the Wildlife Institute of India (WII), Dehradun, on avian behavioural ecology. **Rounak Patra** is an avid birdwatcher, photographer and travel blogger, currently working with the WII. His current research interests include understanding community ecology of birds and their interaction with environmental changes. **Sipu Kumar** is a Ph.D. Scholar at WII. His work on frugivore birds focuses on bird and plant interaction in the Shiwalik hills. **Dr. Amit Kumar** is a faculty at the WII. He has been exploring Himalayan regions in terms of eco-floristics for more than a decade. His research involves understanding vegetation patterns, plant associations and plant invasion ecology.

On interacting with the local inhabitants, we received mixed responses; members of the community of fishermen and wood collectors were unhappy with some conservation management initiatives taken towards the wetland's protection.

SCALING UP PANGOLIN CONSERVATION IN INDIA

ADITYA JOSHI/WCT

By Purva Variyar

Pangolins are elusive, making them hard to track and harder to protect. These endangered mammals are widely poached for their scales. The Wildlife Conservation Trust's collaboration with the Madhya Pradesh Forest Department to gather ecological data and scientifically rehabilitate rescued and confiscated Indian pangolins back into the wild, is an attempt at building sound conservation strategies around this species, writes Purva Variyar.

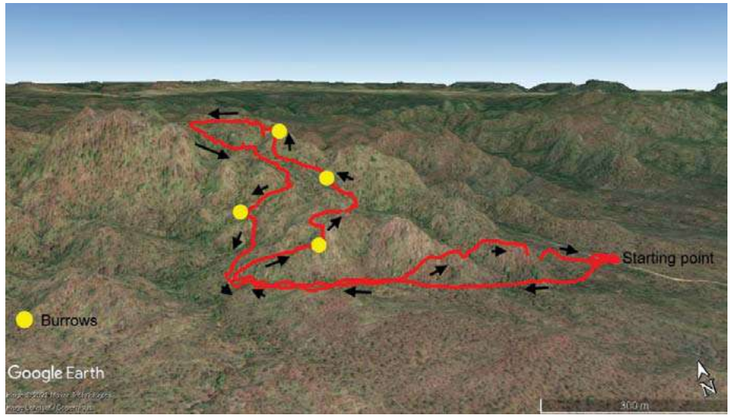
PANGOLINS IN PERIL She is there. Right there, inside a neatly dug-out borrow under those large boulders deep inside the Pench Tiger Reserve in Madhya Pradesh. Previously acquired camera trap footage confirms that she has a pup with her. The strong beeps of the radio telemetry receiver and Hira's (one of WCT's trained conservation dogs) fine, attuned sense of smell tell us that she is there. But elusive, cautious, nocturnal and shy that she is, only a miracle could encourage her to emerge before us.

Very few people have seen pangolins in the wild. Many haven't even heard of them. If they have, it is in the context of the illegal wildlife trade. Among the most heavily trafficked mammals in the world, pangolins' armour of scales, a highly successful evolutionary adaptation that protects them from predators and natural elements in the wild, has become a bane in a world where humans are super-predators. Also called the scaly anteater, this unique mammal is endowed with an armour of metabolically inactive scales that have a chemical composition similar to that of human nails. Yet, misplaced beliefs, disinformation, and scientifically unproven claims have placed an astronomical value on pangolin scales in the black market, especially for use in Traditional Chinese Medicine (TCM).

"The scale of the impact of poaching on species with no population estimates is revealed by the number of cases where a large consignment of pangolin scales weighing up to a couple of tonnes are confiscated in anti-poaching raids. Typically, in the case of crime against wildlife, the rate of detection is very low. Most illegal consignments elude the attention of enforcement agencies.

FACING PAGE *Indian pangolins are endangered, and yet are the most heavily trafficked mammals in the world. They are targeted for their scales and meat.*

WCT



ABOVE **A** *map showing a survey track using detection dogs. The GPS collars fitted on the dogs help track the path, distance, and effort of every survey.*

Given that only a fraction of the raids are successful and that several consignments go undetected, the magnitude of poaching is much larger than what meets the eye," explains Aditya Joshi, conservation biologist with the Wildlife Conservation Trust (WCT). Joshi heads WCT's Conservation Research division. One of the projects he is leading focuses on developing an ecology-based conservation strategy for the Indian pangolin in Madhya Pradesh, a first-of-its-kind project designed around this species.

CONCERTED SCIENTIFIC EFFORT TO PROTECT THE INDIAN PANGOLIN As the Indian pangolin is elusive and nocturnal and occurs at low densities, there is limited information available on its behaviour and ecology. It is vital to know the ecology of the species to develop an effective conservation plan for it.

"Despite protective measures, pangolins in India are widely exploited and traded both domestically and internationally. There has been a rise in the trade of live Indian pangolins as even locals who find a pangolin in the wild look for buyers in anticipation of high monetary returns. This has led to confiscation or seizures of several Indian pangolins, which are kept in poor conditions and starved for a long period on account of an extremely limited or faulty understanding of their ecology. This makes the task of successful rehabilitation of these pangolins a major conservation challenge," Joshi further explains.

In collaboration with the Madhya Pradesh Forest Department (MPFD) and with the support of BNP Paribas India Foundation, WCT embarked on a unique conservation project in 2019. The main challenge in pioneering a scientific research project, for data-deficient species like Indian pangolins, is the lack of any precedent methodology to draw from.

Joshi adds, "However, as limited resources are available for conservation projects, it is critical to focus on key aspects of conservation issues of a particular species and build on them to have a greater impact on species conservation. The objective of our project is to understand the ecology of the Indian pangolin and develop an effective rehabilitation plan for rescued individuals."

The scale of the impact of poaching on such species with no population estimates is revealed by the number of cases where large consignments of pangolin scales weighing up to a couple of tonnes are confiscated in anti-poaching raids.

ON HER TRAIL We make our way through bamboo thickets. All the rain-inflicted wetness has taken the edge off the crunch of dry leaves underfoot. One of the major challenges of field monitoring is tracking the animals in the monsoon season. Heavy rainfall transforms the landscape into a dense, slippery environment, making it harder to follow them. The disturbance caused by rainfall and storms makes it tough to monitor the radio signals and reduces the range at which signals can be received in the field.

After much climbing up and down the undulating terrain, we are yet to get a strong radio signal. One of the radio-tagged pangolins is on the move with her pup. We pass by a few of her now-abandoned burrows. After several minutes of tracking, the radio signal on our receiver gets louder as we warm up to her new location.

Joshi lets Hira take the lead in zeroing in on the pangolin's precise location. He gives a specific command that tells Hira to focus on the pangolin scent. Canine nose pinned to the ground, Hira finally stops at the mouth of a neatly carved-out burrow and sits on her hindquarters, indicating that she has found the source of the scent. We converge at the spot along a slope under a pile of large boulders, and the frantic beeps on our radio receiver verify Hira's claim. A classic pangolin hideout. While Joshi rewards Hira for a job well done, Rajesh Bhendarkar, a researcher on the team, notes down the GPS locations while two other field assistants promptly begin setting up camera traps to monitor the burrow.

RADIO TAGGING PANGOLINS WCT and the MPFD are monitoring several pangolins in the wild in the Pench and Satpura Tiger Reserves. The radio-tagged individuals are offering deep ecological insights into their lives. "Using the spatial, ecological, and behavioural data of the species from the tagged individuals, we want to identify key factors essential for pangolin survival. This will help in the selection of ideal sites for the release of confiscated or rescued pangolins, and increase the success rate of rehabilitation," explains Joshi.

In the project's first year, the team successfully rehabilitated two Indian pangolins that had been confiscated from poachers. This classified as the first-ever case of using radio telemetry to monitor released individuals of this species in the wild.

Rescued or confiscated pangolins are first examined by wildlife veterinarians of the Forest Department and WCT before being fitted with a radio transmitter and GPS tracker, which are non-surgically affixed on two separate hard and inert scales in a way that does not hinder movement or cause discomfort to the animal or its pup. The tagged pangolins are then released at pre-identified sites based on habitat characteristics, where the chances of them settling down are the greatest.

"We also tagged a wild pangolin female with a young one. This particular breeding female will provide valuable insights into the key factors essential for successfully raising young ones and thus, help to identify sites suitable for pangolin breeding," Joshi says.

ENLISTING CONSERVATION DOGS FOR SURVEYS There is no one-size-fits-all approach in field research. Sometimes conventional survey methods don't work owing to a multitude of fluctuating variables. The undulating terrain of Pench and Satpura Tiger Reserves, for instance, makes it difficult to detect burrows using conventional methods.

"We have trained two conservation dogs in pangolin detection and trained them to locate pangolin burrows and pangolin scat. The dogs indicate the burrows and based on the activity level we set up camera traps to monitor those burrows," Joshi goes on to explain. Analysing scat samples will help determine pangolin diet.

TOP RIGHT *MPFD and WCT staff releasing a tagged pangolin. The radio transmitter and GPS tracker are non-surgically affixed in such a way that they do not hinder movement or cause discomfort to the animal or its pup.*

MIDDLE RIGHT *Hira (left), one of WCT's four conservation dogs, helps the team track a radio-tagged pangolin. Conventional conservation methods do not work in the undulating terrain of the Pench and Satpura Tiger Reserves, thus dogs have been enlisted for locating pangolin burrows and scat.*

BOTTOM RIGHT *The WCT research team monitoring a radio-tagged pangolin in the field.*

WCT & MP FOREST DEPARTMENT

PURVA VARIYAR/WCT

WCT

WCT & MP FOREST DEPARTMENT

ABOVE *A camera trap image of one of the radio-tagged pangolins carrying her young one. The young one of a pangolin, also known as a pangopup, clings on to its mother's tail and rides atop her when she goes out foraging for ants and termites. This is an interesting survival strategy as when the mother senses danger and instantly curls up into a ball, the pup gets folded in along with her tail in a protective embrace.*

Of the eight pangolin species found in Asia and Africa, only the Indian pangolin *Manis crassicaudata* and the Chinese pangolin *Manis pentadactyla* are found in India. The Indian pangolin is the largest Asian pangolin species and the third largest of all pangolin species. It has been accorded the highest protection under India's *Wildlife (Protection) Act, 1972*, just like the Bengal tiger, Indian rhino and Asian elephant. The Indian pangolin is listed as an endangered species on the IUCN (International Union for Conservation of Nature) Red List, and its population is speculated to be on a decline. But there is simply too big a knowledge gap to get a clear picture on how the Indian pangolin population is truly faring in the country. Presently, our understanding of their ecology and population dynamics is obscure, to say the least.

CAPACITY-BUILDING AND AWARENESS FOR FOREST STAFF "Pangolins would come to us in a bad shape. As most people are unaware of the pangolin's eating and living habits, the health of rescued or confiscated pangolins deteriorates rapidly in captivity, many succumbing to starvation, trauma, and stress," says Dr. Prashant Deshmukh, Wildlife Vetrinarian, WCT. A significant component of the project has involved training the forest staff in basic pangolin ecology and care to give the rescued or confiscated pangolins a much better chance of survival.

"Such efforts are needed for the protection of this vulnerable and lesser-known species. The rise in market demand and poaching incidents are undeniably impacting their population. Long-term research will help us gather credible data and increase our knowledge of the species, which is a prerequisite for its conservation," according to Ashok Mishra, former Field Director, Pench Tiger Reserve, Madhya Pradesh.

"One of the learnings from last year's pangolin rehabilitation work was the role of transportation in effective rehabilitation and rescue. In most cases, the local forest staff lack the means to safely house and transport pangolins. As a makeshift arrangement, they are generally housed in wire-mesh cages designed to capture civets. This results in excessive stress and injuries to the pangolin," Joshi explains.

To deal with this, Joshi and his team have designed transportation boxes keeping in mind the pangolin's behaviour and needs. These boxes will help to alleviate undue stress befalling any pangolin being moved. WCT has donated these transportation boxes to the Forest Department and they are presently being used by the forest staff to securely transport rescued/confiscated pangolins.

WCT is currently working on a prototype for the safe housing of pangolins where individuals have to be kept in captivity for treatment or examination.

"Looking at the frequency with which live pangolins are being confiscated from illegal wildlife traffickers, there is an urgent need to design a safe holding area that mimics their natural habitat and ensures provisioning of food that constitutes specific species of ants. We are currently discussing the same with experts from countries that have managed to create such spaces and hope to construct something similar in collaboration with MPFD soon. When fully functional, this facility will be able to help traumatised and starved pangolins to regain strength before releasing them into the wild. Consequently, we will be able to reduce the mortality of confiscated or rescued pangolins by a magnitude," explains Dr. Anish Andheria, President, WCT.

If we are to protect these unique animals, we need to know them better. At this critical juncture we are only beginning to unravel the complex lives of pangolins.

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

WCT is currently designing a safe holding area to house pangolins that need treatment or examination. Such a facility, once functional, will help reduce the mortality of confiscated or rescued pangolins by a magnitude.

PROJECT UPDATES

A Sanctuary Report – October & November

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

Anant Bajaj Paryavaran Mitra Kids for Tigers

Mumbai

Post Diwali vacation, Kids for Tigers returned to make a big splash with the 'Save the Tigers' Programme, which included an Eco-Quiz Competition, Just-a-Minute (JAM) Extempore Competition, and a nature trail at the Conservation Education Centre (also known as the BNHS Nature Reserve) on November 19, 2022 in Mumbai. This nature trail was open not only to students and teachers, but also to parents, who were keen to learn more about the programme and explore this urban wilderness.

Seventeen schools participated in the Eco-Quiz Competition, JAM, and nature trail session. During the nature trail, the kids took the initiative to talk about Mumbai's biodiversity and the importance of protecting wild spaces. Parents confessed that they were not unaware that a place like CEC exists in the city. Judges for the JAM session were Dr. Parvish Pandya, Director, Science and Conservation, Sanctuary Nature Foundation and Gaurav Shirodkar, naturalist while Priyanka Barge, ACF SGNP also attended the event and motivated students to consider a career in conservation.

The winners of the JAM session were – First Prize: Mubashshirah Tarique Bukhari, Anjuman-I-Islam BSK Girls School; Second Prize: Taran Shah, St Gregorios High School; Third Prize: Meher Mehta, Lodha World School Thane.

The winners of the Eco-Quiz were Arya Vidya Mandir, Bandra East in First Place, Lodha World School, Thane in Second Place, and Cathedral and John Connon Middle School in Third Place.

All first prize winners received a one-year student BNHS membership, giving them the opportunity to revisit and explore this green haven! All students received participation certificates for the Eco-Quiz, JAM and nature trail. Students, teachers and parents shared positive feedback for the programme, and promised to return for more forays into the CEC trail!

SANCTUARY PHOTOLIBRARY

ABOVE *Students participated in an Eco-Quiz competition and Just-a-Minute extempore competition at BNHS' Conservation Education Centre.*

SANCTUARY PHOTOLIBRARY

ABOVE *Preeti Takle and Sanctuary Nature Foundation staff engage students at the Kids for Tigers 'Save the Tiger' event at the Conservation Education Centre.*

IndusInd Support for Kids for Tigers

Kids for Tigers has expanded its network to six new cities including Bengaluru, Delhi, Coimbatore, Hyderabad, Panna and Nagpur. As part of IndusInd's CSR activities, our first Teachers' Workshop was held in Nagpur on November 26, 2022 to familiarise teachers with the rationale and the calendar of activities planned for Kids for Tigers in the weeks and months ahead. A total of 35 teachers from 16 schools participated and Dr. Tejinder Singh Rawal, one of Nagpur's most respected conservationists, spoke to the teachers about 'Biodiversity and its Current Situation' using interesting anecdotes that had teachers transfixed. Dr. Bahar Baviskar, President and wildlife veterinarian, Wild-CER and One Health practitioner, also spoke to the teachers about the conservation work being undertaken at the grassroot level in the Vidarbha area. This was followed by the last session of the day by Harshwardhan Dhanwatey, Trustee of Tiger Research and Conservation Trust (TRACT), and one of Nagpur's most dedicated tiger defenders. He shared a video on the tigers of Chandrapur and Tadoba. Ekta Bhaiya, Kids for Tigers Coordinator, Nagpur then presented the Annual Kids for Tigers plan themed on 'Only One Earth' the global focus for World Environment Day 2022. The teachers responded saying that the sessions were engaging, and that they would like more such sessions held in the future for the benefit of the students in their charge.

HT Parekh Kids for Tigers

Kolkata

Kids for Tigers has registered 55 schools in the city since August 2022 and coordinators Joydip and Suchandra Kundu conducted seven audio visual sessions. The most awaited Kids for Tigers Teachers' Environmental Leadership Workshop was also held on November 15, 2022. A wonderful group of 102 teachers from the registered schools attended the workshop to learn how they can integrate environmental education into their regular subjects.

The Kolkata team also took on an awareness campaign to highlight the impact of firecrackers during festivals. Studies have shown that the chemicals used emit harmful toxins, including heavy metals that harm the environment, animals, birds, and human health. The Government of West Bengal allowed only green fireworks during Kali Puja, as directed by the Kolkata High Court. Students from Kids for Tigers schools across India have pledged to similarly celebrate Diwali in an Earth-friendly way! Selected students from Kids for Tigers schools in Kolkata recorded messages saying 'no to firecrackers' and encouraging the use of traditional clay *diyas*, which are biodegradable, eco-friendly and beautiful, as part of the awareness campaign. The videos were published on our social media platforms. This campaign was part of a national communication strategy to highlight for both teachers and students, the umbilical connection between climate change, air and water pollution and biodiversity depletion.

Sundarban: Bagh Sankalp

On October 20, 2022, the Bagh Sankalp initiative conducted the Teachers' Environment Leadership Workshop with 42 teachers from 20 different schools around the Sajnekhali Wildlife Sanctuary of the Sundarban Tiger Reserve. The workshop was conducted at SHER's Community Conservation Centre Bagh Bon, located at Pakhiralay, to help educators transform their practices and link education to action in meaningful and engaging ways. The focus of the workshop was on the "Role of a teacher working in this human-tiger interaction zone of the climate-fragile Sundarban system, in building an ecologically responsible village society".

The special guests of the day were Soumen Mondal, WBFS, Assistant Field Director of Sundarban Tiger Reserve (STR) and Arko Raut, Range Officer of Sajnekhali Wildlife Sanctuary. Dr. Arijit Chatterjee, Prof. of Zoology; Dr. Anindita Mazumdar, Prof of Environmental Science; and Niladri Kundu, wildlife photographer and IT professional, began the workshop with their engaging lectures.

Suchandra Kundu, Honorary Wildlife Warden of Kolkata, also guided teachers on how they can encourage students to record their daily observations of local wildlife and biodiversity through simple sketches and notes. Such early connections made will sensitise tomorrow's leaders to the need for independent thinking and orient them towards the need to look upon the biosphere as the ultimate 'infrastructure' required for the good health and security of all living creatures, including humans.

The workshop concluded with discussions about the importance of ecological knowledge. Conservation of the Sundarban was stressed upon, as well as the need for alternate livelihood options for locals.

'Art for Conservation' events were conducted in Sundarban along with two nature awareness walks for youth. A cycle rally was held to convey to the large number of residents of Pakhiralay Island how vital it was to protect the mangrove ecosystem that is the foundation of life in the Sundarban Biosphere. A meeting of local journalists was also held to emphasise the importance of tiger conservation and community awareness role they can play to provide accurate coverage and perspective with regard to climate change and biodiversity protection.

Morningstar Kids for Tigers' Village Contact Programme

Ranthambhore

October and November continued to be busy months at the Kids for Tigers' project sites in Ranthambhore, starting with celebrations for National Wildlife Week between October 2 and 9, 2022. As many as 10 visits to the Ranthambhore Tiger Reserve were conducted for children from local villages with over 350 children being given the opportunity to experience the famous forest next to which they live. Sanctuary's Sawai Madhopur Coordinator, Govardhan Meena, a tribal boy who has been part of Kids for Tigers since he was a child himself, said it would help protect their own natural heritage, when they grew up. A vibrant nature education session was also conducted for 200 village children by Govardhan Meena and his team at the Rajiv Gandhi Museum in Ramsinghpura to mark the end of Wildlife Week.

Other activities included drawing and essay competitions on themes related to wildlife conservation, selective planting of native tree, wildlife quiz competitions, and an exciting *nukkad natak* (street play). Hundreds of children are being thus educated about the importance of protecting wildlife and biodiversity, and coexisting peacefully with nature – a central tenet of the Kids for Tigers programme. During Diwali, sweets were distributed to forest guards in the Ranthambhore Forest Department as a gesture of gratitude for their hard work in patrolling and protecting this tiger forest. Additionally, film screenings were conducted to educate the public about the importance of saving tigers, their co-denizens and the forests crucial to both humans and wildlife. A series of travelling wildlife poster exhibitions were also conducted at different schools close to the Ranthambhore Tiger Reserve.

SANCTUARY PHOTOLIBRARY

ABOVE *Students from Kids for Tigers schools near the Ranthambhore Tiger Reserve undertaking a clean-up drive as part of the National Wildlife Week celebrations in October 2022.*

Sanctuary's

MUD ON BOOTS

Bimonthly Updates for September-October 2022

Meet our New Project Leaders!

This year, our team received over 35 nominations for the 2023-25 batch of Mud on Boots Project Leaders. While each nominee was found to be exceptional in their own right, we narrowed down the selection based on four criteria – mentorship availability, access to other opportunities, project urgency, and potential for growth. The final five projects we have chosen to support represent a diversity of personalities, landscapes, species, and approaches to biodiversity conservation. We are thrilled to work with them over the next two years and bring their stories to our readers and supporters.

SHASHANK LADEKAR AND KANHAIYA UDAPURE

Gondia district, Maharashtra

In the agricultural fields and 'tanks' of the Gondia district, Shashank Ladekar and Kanhaiya Udapure are protecting Sarus Cranes and working towards wetland conservation. These young conservationists are volunteers with a local organisation, Sustaining Environment and Wildlife Assemblages (SEWA), and field assistants to a Ph.D. researcher identifying opportunities for waterbird conservation in Central India. Over the years, Shashank and Kanhaiya have arranged wildlife awareness meetings in 55 villages and 20 schools in the buffer zones of the Navegaon-Nagzira Tiger Reserve; recorded the presence of the Indian grey wolf in new locations; rescued and rehabilitated injured wildlife; and assisted the Forest Department in managing human-wildlife encounters. They also monitor Sarus Crane nests in their districts and are planning to nurture a seed bank for wetland restoration efforts.

Drawing on their past experiences and skillset, Shashank and Kanhaiya are committed to working with Gram Panchayats in at least 10 villages across the district to strategise wetland management techniques that can support wildlife and provide livelihoods to people. While Kanhaiya is an excellent birder and fledging photographer, Shashank has the magic touch when it comes to animal care. With support from the Mud on Boots Project, this dedicated pair will give fresh impetus to wetland conservation in the state of Maharashtra.

Shashank Ladekar and Kanhaiya Udapure are committed to working with Gram Panchayats in villages in Gondia district to strategise wetland management.

JESU DAS

Mandya district, Karnataka

Born in a village near Nanjangud town on the banks of the Kabini river, Jesu Das is a gifted fisherman with immense knowledge of fish, fish behaviour, and traditional fishing techniques. He has been working as a field operative with the Wildlife Association of South India (WASI), where he discovered new applications for his traditional skills and practices. His understanding of river ecology, keen observation skills, and accurate species' identification have paved the way for the rediscovery of fish that were once believed to be locally extinct. He has led several field excursions into remote stretches of the Cauvery river basin, looking for the critically endangered and endemic humpback mahseer. His enthusiasm and zeal have led him to serve a crucial role at the Humpback Mahseer Repository Facility set up by the Karnataka Forest Department at Bheemeshwari.

With support from the Mud on Boots Project, Jesu is committed to continuing his work towards protecting the humpback mahseer by managing and stocking the Mahseer Repository Facility, providing orientation to visitors, educating his peers, and contributing to research projects underway in the Cauvery basin. Jesu will also be training interested youth in the age-old art of cast net fishing, to ensure the continuity and responsible application of this ancient and irreplaceable skill.

Saddam Husain Lodha will focus on nature education, conservation and mobilising youth volunteers.

SADDAM HUSAIN LODHA,

Haridwar district, Uttarakhand

Trained in birdwatching, plant identification, and bat research, Saddam Husain Lodha is an inspiring community conservation leader. Having initially worked daily wage jobs in apple orchards, poultry farms, and chemist shops, he went on to become a brilliant field assistant to researchers conducting studies in his district. Saddam is also a key member of Maee, a unique grassroots organisation founded and run by *Van Gujjar* youth from Gujjar Basti in Haridwar district, Uttarakhand. Their work ranges from increasing capacity and generating employment opportunities within their community, documenting traditional *Gujjar* knowledge of the forests, and improving knowledge of gender and sexual identity to imparting nature education and involving children in citizen science projects.

With support from the Mud on Boots Project, Saddam wants to sharpen Maee's focus on nature education and conservation by leading local youth in monitoring populations of the barasingha or swamp deer in the Jhilmil Jheel Conservation Reserve and surrounding areas where they are hunted. Saddam also plans to mobilise Maee's existing army of youth volunteers to monitor the birds around the Jhilmil Jheel Conservation Reserve, and form a street play troupe to perform plays as a form of nature education and outreach in Gaindikhata, Haridwar district, Uttarakhand.

Jesu Das is committed to continuing his work toward humpback mahseer conservation.

Sahebram Bediya and Chamru Bediya plan to document the biodiversity in and around Jharkhand's Koynardih village by involving community members.

SAHEBRAM BEDIYA AND CHAMRU BEDIYA

Ranchi district, Jharkhand

Described as 'a ray of hope for community-led conservation' by their associates, Sahebram and Chamru Bediya are shaping new ideas in Jharkhand's Koynardih village. The duo has excellent knowledge of the forests that surround their village and lead Ekastha Trails, a homegrown eco-tourism initiative that introduces tourists to nature via guided treks and trails. They also document local biodiversity, introduce community youth to wildlife conservation, and organise clean-up drives along their trails. Both conservationists are graduates of Green Hub's Central India Fellowship and have been trained in video documentation. As members of the marginalised *Bediya* community, Sahebram and Chamru want to highlight Jharkhand's wildlife, provide green jobs for their community, and use their cultural knowledge to reduce deforestation and hunting in their village.

During their term with the Mud on Boots Project, Sahebram and Chamru plan to document the biodiversity in and around Koynardih by involving interested community members. They will also work towards restoring degraded patches of forest. Independently, Sahebram will be creating videos on coexisting with wildlife, while Chamru will be developing their eco-tourism model to benefit their community.

The Asukhomi Community Reserve Management Committee is dedicated to building an inclusive culture of community-based conservation.

SOURCE: THE MORUNG EXPRESS

People of Asukhomi village voluntarily surrendered their hunting weapons at a public meeting organised by the village council in Zunheboto on May 13, 2022.

ASUKHOMI COMMUNITY RESERVE MANAGEMENT COMMITTEE

Zunheboto district, Nagaland

In May 2022, the people of Asukhomi village voluntarily surrendered their guns and hunting weapons at a public meeting organised by the village council. This show of solidarity towards conservation efforts was guided by the 12 conservation-minded residents of Asukhomi village that comprise the Asukhomi Community Reserve Management Committee. Spread across 280 ha. of forest, the Asukhomi Community Reserve was notified in 2020 with the consent of locals. This lush forest ranges in elevation from 600 to 2,200 msl. and boasts a wide diversity of wild species. Through their persistent outreach programmes and using their strong social bonding skills, the committee has cultivated conservation practices that include the nurturing of native plants, sustainable collection of non-timber forest produce, and wildlife rescue and rehabilitation. The committee is also entrusted with awareness programmes, livelihood initiatives, and community outreach.

Dedicated to building an inclusive culture of community-based conservation in Asukhomi, the committee is now training youth to document biodiversity. With support from the Mud on Boots Project, they will create a local biodiversity register in both the *Sumi* dialect and the English language. This will be an invaluable document that will record not just biological diversity but will preserve local and traditional knowledge, and be used to develop an agenda for conservation action.

BORDERS NEITHER AUTHENTICATED OR VERIFIED

SHIVANG MEHTA PHOTOGRAPHY TEAM

BRINGING THE CHEETAH BACK TO INDIA

By Dr. Y. V. Jhala

After scientific evaluation and site selection based on habitat suitability, prey availability, and human impacts, the Prime Minister of India released the first three cheetahs from a batch of eight that were brought from Namibia, in the Kuno National Park on September 17, 2022. These eight cheetahs are the first of several to be brought to India as part of an ambitious project to reestablish the lost species as a managed metapopulation. It is the first intercontinental reintroduction of a large carnivore in recent times based on the guiding principles of the International Union for Conservation of Nature (IUCN) and modern conservation science.

A TRAILBLAZING PROJECT

Today human actions have impacted natural systems in some form or another. True wildernesses devoid of human influence, either terrestrial or in the oceans, are a myth. A major impact of humans in the Anthropocene is the reduction of species' range and their total annihilation. The rate of species loss in our era is akin to the time of the mass extinction of the dinosaurs some 65 million years ago. Fortunately, nature has endowed our species with the intellect to understand and redress our impacts on the planet. Human aided restoration of species through reintroductions is an important arsenal in the toolbox of conservation biology.

The cheetah, the only large carnivore driven to extinction in independent India, between the 1950s and 1960s by human actions, therefore presented an ideal case for reintroduction. The project suffered a major setback in 2013 when the Hon'ble Supreme Court passed a judgement in favour of reintroduction of lions from Gujarat to Kuno National Park, Madhya Pradesh. In this judgement, the

FACING PAGE *The first two cheetahs from the Cheetah Conservation Fund, Namibia, that were released by the Prime Minister of India on September 17, 2022 at Kuno National Park, in their quarantine boma.*

The description of the cheetah in the *Vedas* and depictions in pre-historic cave paintings bear testimony of the species being an integral part of India's ancient natural and cultural heritage. The word cheetah is of Sanskrit origin. Indeed, the cheetah was probably a major evolutionary force that shaped the speed of the blackbuck, which would have constituted its major prey. Reintroduction of the cheetah is not a new idea; it was discussed in the first meeting of the Indian Board of Wildlife in 1952. Today, the major threats that resulted in the extinction of the cheetah have been abated, and India now has the economic and scientific ability as well as the political will to bring back the species. In an international workshop in 2009 organised by the Wildlife Trust of India at Gajneer, conservation biologists, IUCN cat and reintroduction specialists, cheetah biologists, wildlife managers and policy makers from across the world met and discussed the possibility of reintroducing cheetahs to India. Based on the workshop's outcome, the Ministry of Environment, Forests and Climate Change (MoEFCC) mandated me from the Wildlife Institute of India (WII) and Dr. M. K. Ranjitsinh, Chairman, Wildlife Trust of India (WTI) to scientifically evaluate the possibility of reintroducing cheetahs.

Chronology of Events

- Prehistoric cave paintings of cheetahs in Madhya Pradesh; mention of cheetah in *Vedas* and *Puranas*
- 1952: Cheetahs declared extinct in India
- 1970s: Discussions with the Shah of Iran regarding exchange of lions from Gujarat for Iranian cheetahs
- 2009: Gajneer Workshop on cheetah reintroduction
- 2010: Report on site evaluations – Ranjitsinh & Jhala 2010 (http://www.catsg.org/cheetah/05_library/5_3_publications/R/Ranjitsinh_&_Jhala_2010_Assessing_the_potential_for_reintroducing_cheetah_in_Iran.pdf)
- 2013: Supreme Court judgement on lion reintroduction in Kuno, wherein introducing cheetahs from Africa was not permitted
- 2014: The National Tiger Conservation Authority (NTCA) files an affidavit requesting the Apex Court to reconsider their 2013 order with respect to cheetahs from Africa
- 2020: The Apex Court permits the introduction of cheetahs from Africa on an experimental basis
- 2021: Explorations, collaborations, and negotiations with Namibia and South Africa for sourcing of wild cheetahs. Action Plan for Cheetah Introduction to India released by Minister, MoEFCC https://wii.gov.in/images/images/documents/publications/action_plan_cheetah_introduction_jan_2022.pdf
- July 2022: Memorandum of Understanding signed with the Government of Namibia
- August 2022: Eight cheetahs including three free ranging ones, two from game reserves, and three wild caught orphans quarantined at the Cheetah Conservation Fund Facility in Otjiwarango, Namibia
- September 16-17, 2022: First batch of eight cheetahs from Namibia translocated to Kuno National Park by chartered flight and Indian Air Force helicopters, and released into a quarantine facility by the Prime Minister of India.

FACING PAGE LEFT Amit Mallick, NTCA and Y. V. Jhala, WII, radio-collaring an anesthetised cheetah in South Africa as part of the cheetah metapopulation programme and training exercise before translocation to India.

ABOVE *Team of researchers from the WII offloading cheetahs that arrived in specially-designed crates from Namibia at their quarantine facilities in the Kuno National Park.*

ABOVE RIGHT *Cheetahs awaiting their feed in the homas, a good time to evaluate their health and condition by close inspection. There is no record of a wild cheetah fatally attacking a human.*

Goal of Cheetah Reintroduction

Establish a viable cheetah metapopulation in India that allows the cheetah to perform its functional role as a top predator and provides space for expansion within its historic range, thereby contributing to its global conservation efforts.

Objectives

1. To establish breeding cheetah populations in safe habitats across its historic range and manage them as a metapopulation.
2. To use the cheetah as a charismatic flagship and umbrella species to garner resources for restoring open forest and savanna systems that will benefit biodiversity and ecosystem services of these ecosystems.
3. To enhance India's capacity to sequester carbon through ecosystem restoration activities in cheetah conservation areas and thereby contribute to global climate change mitigation goals.
4. To use the ensuing opportunity for eco-development and eco-tourism to enhance local community's livelihoods.
5. To manage any conflict due to cheetahs or other wildlife with local communities within cheetah conservation areas expediently through compensation, awareness, and management actions to win community support.

introduction of cheetahs from Africa into Kuno was considered illegal. However, based on an affidavit filed by the National Tiger Conservation Authority (NTCA) with assistance from conservationist and wildlife expert Dr. M. K. Ranjitsinh (Sanctuary Lifetime Service Award 2014) and the Wildlife Institute of India in 2014, the Apex Court permitted the introduction of the African cheetah on an experimental basis in 2020.

SELECTING A SOURCE POPULATION Ideally, the Asiatic cheetah should have been reintroduced to India. However, the only surviving Asiatic cheetahs are in Iran and survive as a relict population of 15-20 individuals and are on the verge of extinction, highly inbred, and any removal would further endanger their survival, making them unavailable and unsuitable for the Indian reintroduction programme. In case the original race or subspecies is not available for reintroduction, the IUCN recommends using the closest genetic/ecological equivalent subspecies/race. The latest full genome sequence study of cheetahs across their historical range published in 2022 by Prost et al. in *Molecular Ecology* suggest that all cheetah sub-species are genetically equidistant from *Acinonyx jubatus venaticus*, the Asiatic cheetah subspecies. Thus, criteria other than genetics take precedence in selecting the source population for the Indian reintroduction. For establishing any new population of cheetahs, 30-40 individuals that are genetically diverse, disease free, can hunt, avoid predators

ABOVE *Prehistoric cave painting (older than 10,000 years) showing a cheetah with its characteristic body and tail shape at Chatrabhuj Nallaha in the Gandhi Sagar Wildlife Sanctuary, Madhya Pradesh.*

and humans, are required. According to the guidelines of the IUCN, the only population of cheetahs that meet these criteria are from southern Africa. Between Namibia, South Africa and Botswana, there are about 4,000 cheetahs that can sustain an offtake of 30-40 individuals without negatively impacting the source population. In fact, the metapopulation of cheetahs maintained within fenced game reserves of South Africa has registered a growth rate of nine per cent over the past 10 years and the metapopulation managers are seeking reserves (space) to accommodate this rapidly growing population. Cheetahs in other parts of their range are declining. Just as in India, the wild cats have become locally extinct in 15 of their range countries since the 1940s. Their extant range is only nine per cent of the historical range. Thus, reintroduction of cheetahs into India contributes to the global goal of conserving the cheetah as a species by providing safe habitats for its expansion.

ENSURING A SAFE SPACE For sustaining a wide-ranging large carnivore, the site should have sufficient prey, habitat, and minimal human disturbance. These requirements ensure that large carnivores serve as umbrella species for biodiversity conservation. Indeed, the recovery of tigers across the forested landscapes of India has witnessed the recovery of many threatened species, as evidenced from the large-scale camera trap surveys conducted across India by the NTCA-WII-State Forest Departments every four years since 2008. The charisma of the cheetahs has captured the interest of political leaders and senior bureaucrats making government resources available for the restoration of savannah and open forest ecosystems. These biomes, along with their threatened biota have been neglected. We have failed miserably in trying to use the indigenous wolf, blackbuck, caracal, four-horned antelope, Lesser Florican and the Great Indian Bustard, as flagships to harness the required resources for the restoration and conservation of these systems. Requirements for the cheetah and the above-mentioned species are synonymous. Restoration investments required for introducing the cheetah are bound to benefit the entire biotic community of these ecosystems. The funds allocated for cheetah introduction are not at the cost of other species conservation programmes as is often touted. If funds allocated for restoring habitats and prey at proposed cheetah conservation reserves are not used for this purpose, then they would likely be used by the government for other purposes such as constructing roads or other infrastructure. Vast landscapes of Kuno, Gandhi Sagar, Nauradehi, and Shahgarh each ranging from 2,000 to 6,000 sq. km. would benefit from being declared as cheetah conservation reserves.

Restoration investments required for introducing the cheetah are bound to benefit the entire biotic community of these ecosystems.

A FOREST AWAITS Despite the Supreme Court order of 2013, Asiatic lions from Gujarat were not relocated to reach Kuno National Park. After a huge investment by the Central and State Governments and communities from 20 villages giving up their ancestral homes, Kuno was prepared to receive the lions. The legal status of a 350 sq. km. Kuno Wildlife Sanctuary was enhanced to a 748 sq. km. Kuno National Park embedded in a suitable habitat of over 6,000 sq. km. From an ungulate density of less than five per square kilometres in 2006, with stringent control of poaching and bioresource extraction, the ungulate density reached more than 45 sq. km. in 2014. However, by 2018, on account of delays in the reintroduction of lions from Gir, the motivation and incentive of Protected Area managers dwindled and Kuno National Park began to slip. Ungulate density dropped to ~30 sq. km., and poaching was evident in several parts of the park. The Hon'ble Supreme Court's permission for the introduction of cheetahs from Africa to India was a shot in the arm for Kuno. Competent officers were appointed by the Madhya Pradesh government, enthusiasm surged again amongst park management. Resources were allocated, and to add to it, the Prime Minister of India came to Kuno to release the first cheetahs on Indian soil. Effective conservation can only happen if people will it to happen through the government. Kuno may have been the ideal site for a second home for Asiatic lions based on the opinion of conservation science, however, it is impossible to implement a reintroduction unless the government believes in it and owns it. Perhaps, conservation biologists failed to communicate the correct narrative in the case of lions to the government. Kuno needs the cheetahs just as much as Sariska needed tiger reintroduction for its survival. If cheetahs were not brought to Kuno, the national park would have deteriorated further. It is ideal when science guides conservation implementation, but conservation scientists need to learn to adapt, so as to gain the greatest grounds for conservation and not be lost in their dogma, which can be counterproductive for the cause.

Kuno's habitat comprises a dry-deciduous open forest system, dominated by Anogeissus-Acacia thorn forests, mixed forests, open meadows (which were earlier agricultural fields), and riverine forests, making it one that is ideal for cheetahs, according to cheetah experts who visited and evaluated the site. The prey base primarily consists of chital, hare, peafowl, wild pigs, some four-horned antelope, chinkara, and young of sambar and nilgai. The potential for reintroducing blackbuck exists in plateau areas. In the absence of tigers and lions, the leopard is the apex predator and it occurs at a high density in Kuno. Cheetahs that are being reintroduced have had exposure to leopards in Africa (besides lions, spotted hyenas, and wild dogs) and should be able to cope with Kuno's leopards. There will be losses of cheetahs (especially cubs) to leopards, snares set for bush meat, and other human-caused impacts; this is expected in any reintroduction programme and should not be cause for alarm but needs to be managed with law enforcement, community sensitisation and upliftment, and additional supplementation of cheetahs. There were speculations amongst critics that African cheetahs that have subsisted on antelope may not kill deer. This myth has already been proven wrong with the introduced cheetahs making regular kills of chital deer. Introduction of the cheetahs in no way compromises Kuno's potential for housing lions and tigers. Actually, a top predator like the lion and tiger would help reduce the density of leopards in Kuno, thereby facilitating the establishment of the cheetahs.

The cheetah is a tourist magnet, and offers several opportunities that are not possible with other large carnivores

A CHANGING LANDSCAPE There has been a mad rush to purchase real estate in the vicinity of Kuno National Park. With the release of the first cheetahs by the Prime Minister, community land owners have become rich overnight, with some land prices shooting up almost a 100-fold! The Chief Minister of Madhya Pradesh in a public address at Kuno, before the arrival of the cheetahs, announced that lands of relocated villages from Kuno National Park will be gazetted as revenue villages, providing privileges of political self-governance and free sale. The Union Minister of Environment, Forest and Climate Change and senior bureaucrats visited peripheral villages, educating and sensitising adults and school children about cheetahs and their ecosystem. A cheetah mascot 'Chintu Cheetah' is used by the Forest Department to promote cheetah conservation. There is sufficient hype and goodwill for the cheetah in the local communities within the landscape and there is real potential for economic gain by them, provided policies are framed appropriately and in time. A landscape eco-tourism plan that promotes eco-sensitive and aesthetic tourism, where opportunities for local communities are safeguarded, needs to be urgently developed and implemented. Subsidies for purchasing safari vehicles, home-stays, training and certification of nature guides are some ways to ensure that livelihoods improve. The cheetah is a tourist magnet, and offers several opportunities that are not possible with other large carnivores. Unlike tigers, lions, and leopards that remain active at night, the cheetah is diurnal. Witnessing a cheetah hunt can be a life changing experience. Revenue from tourists, especially gate receipts of park entry should be shared with buffer zone communities, as is the norm for most tiger reserves.

SHIVANG MEHTA PHOTOGRAPHY TEAM

FACING PAGE *Shri Narendra Modi, the Prime Minister of India, looks on as the cheetah he released walks out into the quarantine boma from the crate it travelled in from Namibia to Kuno National Park in an epic transcontinental journey of 16 hours by road, plane, and helicopter.*

LESSONS TO LEARN The Cheetah Action Plan explicitly outlines the constraints of establishing viable cheetah populations in India. Reintroductions require long-term commitment of resources, continuous supply of appropriate animals from the source, and political will – which is currently the least restrictive. Vast wildernesses of several thousand square kilometres devoid of humans is impossible to secure in India. For that reason, several smaller populations need to be established and managed as a metapopulation. Eight cheetahs cannot establish a population, conservation science proposes importing 8-15 cheetahs each year for the next five to eight years to establish three to five different populations in India. Long-term viability of cheetahs in India is possible when these populations are established and managed together, just as is being done in South Africa. The difference between South African wildlife populations and wildlife in India is that in the former, wildlife is contained by physical barriers (electric fences) since local communities are intolerant; in India, physical barriers are replaced by fences of community tolerance. Lions, tigers, leopards and elephants move across human dominated landscapes through habitat corridors (albite with conflict). If conservationists and wildlife managers fail to establish community tolerance towards the cheetahs, then establishing cheetahs in India would fail. Cheetahs are comparatively easier to live with than tigers, lions, leopards and elephants. There is no record of a wild cheetah killing a human. Local communities around Kuno are used to living with leopards, and in the recent past with tigers. The cheetah project has adequate funds to pay compensation for any small livestock that is likely killed by cheetahs. However, mechanisms for prompt and fair payment will determine the success of this important mitigation measure.

An exemplary coexistence model is presented with lions and the people of Saurashtra. This model has much to teach the global conservation community about how people can live with large carnivores. The Gir Protected Area is too small to accommodate a viable lion population and 75 per cent of the 600 odd Asiatic lions share their habitat with people and their livestock. This coexistence is not without conflict, but on account of the cultural reverence for lions, a reasonable compensation scheme for livestock depredation by the Gujarat Forest Department, adaptive behaviour of lions (primarily scavenging livestock, avoiding peak human activity time, and using refuge habitats), and the huge economic benefits resulting from having lions in their neighbourhood, locals tolerate lions. Cheetahs have large home ranges and are likely to roam out of the Protected Areas into human-dominated parts of the landscape. Just like with the lions in Saurashtra, local people should be encouraged to see an opportunity here, cheetah viewing on private/public lands outside of the Protected Area can be a major source of revenue. If proper checks and balances are built from the beginning to legitimise such an activity, within the ambit of the *Wildlife Protection Act*, then the problems associated with locals taking liberties as has happened with lion shows in Saurashtra can be prevented. Once local communities experience the huge economic benefits emanating from cheetahs, loss of an occasional goat or sheep would not be an issue anymore. Such an approach would ensure that cheetahs flourish in India, beyond Protected Areas that would serve as breeding sources, and the larger human-dominated landscapes as sink and corridor habitats.

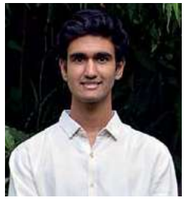
The first cheetahs arrived from the quarantine facility of the Cheetah Conservation Fund, Otjiwarango, Namibia in Gwalior after a long 16-hour journey in a spectacular chartered plane with a painted tiger face – symbolic of a lost carnivore being restored in the land of the tiger! The cheetahs were accompanied by cheetah biologists, veterinarians, and managers from CCF Namibia, and South Africa and India. These experts used the best combination of transportation techniques and long-lasting anti-anxiety tranquilisers to ensure a safe, 100 per cent mortality-free transfer of the delicate cats that are known to be extremely vulnerable to stress. From Gwalior, two Airforce MI-17 helicopters (the least noisy of cargo choppers available with the Indian Airforce) flew them to the heart of Kuno National Park where a specially designed, soft release, predator-proof enclosure was built. Within this electrified fencing were built fortified quarantine bomas according to the specifications of the Disease Risk Assessment requirement by the IUCN and the Indian Department of Animal Husbandry and Dairying. It is here that the first cheetahs were released on Indian soil by the Prime Minister of India.

This event heralds the successful first 10 per cent of this ambitious project. The actual test begins when these cheetahs and many others are made free ranging; their survival, reproduction, and recruitment will herald the successful establishment of one population. Cheetahs would be established in India when three to five such populations flourish and are managed as one metapopulation. No doubt a daunting task, but possible to achieve if executed as planned and proposed with adaptive management, over the long-term. Such an accomplishment would not only bring back an extinct, charismatic carnivore, but will also result in the restoration of several thousands of square kilometres of degraded dry forest-savanna, along with their ecosystem services of sequestering carbon, providing water, oxygen, and livelihoods to poverty-ridden communities. All this at the same cost that we spend to build a couple of concrete flyovers in our cities to reduce commute time from home to work. Is this not a bargain?

Shivang Mehta Photography Team: Allen Jacob, Parveen Chandila, Shivendra Gaur

SOHAM KACKER

Plant Pirates



By Soham Kacker

A rootless, leafless, glowing, tangled mass of translucent stems cloaks an old Acacia tree. What appears like a giant helping of botanical spaghetti is in fact one of the most cunning plant parasites on the planet – meet *Cuscuta*, or the dodder. The Acacia tree will likely die, but the dodder has moved to its next host – its probing tendrils already coiled tight around multiple neighbouring species. The hosts all eventually fall, but the dodder is here to stay.

Cuscuta seeds germinate on the forest floor, each seed giving rise to a weak root and a highly sophisticated growing tip. A large genus comprising around 200 vining, parasitic species, *Cuscuta* seedlings must find a host, or they will die within five days. Almost as they germinate, the seedlings begin to sense, and grow towards, chemicals emitted by their host plants – primarily volatile organic compounds that help plants communicate. Not only can the dodder 'smell' its hosts without a nose, it can differentiate between chemicals from different plants, only extending its tendrils in the direction of the species it is accustomed to parasitising. Upon contact with a host plant, the dodder coils around its stems, and the primary root dies away; the vine is now entirely dependent on its host. Nearly all *Cuscuta* species have a severe deficiency of chlorophyll, or lack it entirely, as indicated by their pale yellow, orange or pink stems. Unable to create their own food like most green plants, they have evolved specialised roots called haustoria, which grow horizontally into the host stems and tap into its nutrient transport vessels. Intimately interlaced with its host, the dodder draws all the water and nutrients required to flower, fruit and reproduce, effectively sucking the host dry.

But food and water are not all the dodder steals. A recent study on the golden dodder *Cuscuta campestris* found that 42 regions in the dodder's DNA, comprising 108 genes, originated from host species. *Cuscuta* species have evolved over time to pull-off a physiologically complex DNA heist from their hosts – incorporating the functional genes into their own genome, and using them to find and parasitise their hosts more efficiently by eluding their defences. This process of horizontal gene transfer (obtaining genes from an individual that is not a parent) is unprecedented in complex organisms, and its exact mechanism has still not been uncovered. In an even more astounding discovery, the study found that dodders can steal genes, modify them, and reintroduce them into their hosts to silence, or 'switch off' some host genes – perhaps those linked to defence or reproduction. This level of genetic manipulation, only achieved by humans in the early 1990s through recombinant DNA technology, was already in the dodder's arsenal millions of years ago!

Cuscuta comprises just 200 of the known 4,000 parasitic plant species – collectively representing one per cent of the plant kingdom. Groups such as the mistletoes (*Viscum sp.*) are also parasitic, and are pharmacologically and culturally significant. On account of their unique reproductive biology, parasitic plants are chronically understudied as they are hard to find, and usually impossible to cultivate ex-situ, meaning they are almost absent from conservation assessments. A newly launched project at Botanic Gardens Conservation International in the U.K. aims to document and facilitate the cultivation of parasitic plant taxa across the world, so we can protect, and also learn, from these pirates of the plant world.

Further reading:

Davis, Charles C, and Zhenxiang Xi. 'Horizontal Gene Transfer in Parasitic Plants', Current Opinion in Plant Biology, *Vol. 26, 2015, pp. 14-19, https://doi.org/10.1016/j.pbi.2015.05.008.*

penn_state. 'Parasitic Plants Use Stolen Genes to Make Them Better Parasites', EurekAlert!, https://www.eurekalert.org/news-releases/604782. Accessed November 11, 2022.

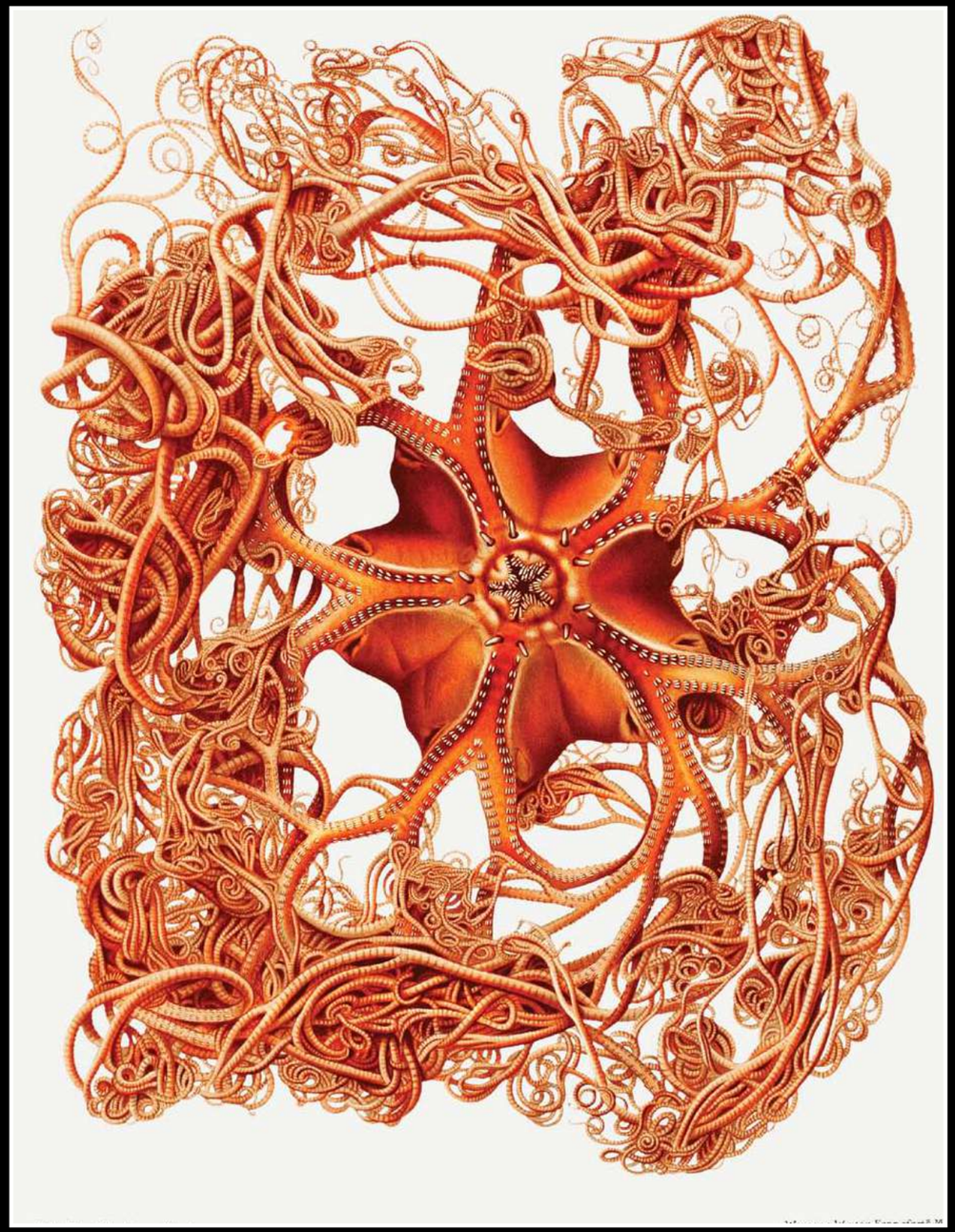
Soham Kacker is passionate about plants and has apprenticed at the Auroville Botanical Gardens and the Aravalli Biodiversity Park. Based in New Delhi, he is currently a research student at Ashoka University, focusing on plant ecology and conservation.

PUBLIC DOMAIN/WIKIPEDIA

ABOVE *What appears like a giant helping of botanical spaghetti is in fact one of the most cunning plant parasites on the planet* – Cuscuta, *or the dodder*.

FACING PAGE *Dodder flowers can range from white to pink or yellow to cream in colour. Their seeds are minute, produced in large quantities and can remain viable for 5-10 years in the soil.*

PUBLIC DOMAIN



With its base anchored in the sea floor, *Gorgonocephalus arcticus* entices food into its waving, extended, tendril-like arms. This invertebrate, a species of basket stars, has five arms, and moves along the ocean floor. Each arm has two branches that divide into sharp-hooked sub-branches. If broken or chopped off, the limbs can grow back. The metre-long arms are twisted together to form a basket, to capture drifting zooplankton that are wrapped in mucous strands and pulled to the star's mouth as a tasty morsel. The same twisting arm branches can turn into a ball when the star finds itself in danger of becoming another's prey.

The Sanctuary Papers

By Shatakshi Gawade

THE MYSTERIOUS AVIAN DISAPPEARANCE

For close to a century, nobody knew what had happened to the Carolina Parrot. *Psitticus caroliniensis*, the only parrot native to North America, was suspected to have been pushed to extinction because of human activities – habitat encroachment and killings. The last known wild specimen was killed in 1904 in Florida. And on February 21, 1918, the last living individual of this 30 cm. bird died in the Cincinnati Zoo.

The Carolina Parakeet was at one time found all along America's east coast. The only endemic species of North America, this parakeet lived in old, swampy forests along rivers. Its habitat was lost to agriculture, and likely fragmented on account of natural disasters. Some farmers recognised its importance in controlling invasive cockleburs in fields. However, there were others who considered them pests, and shot them. It is believed, the brilliantly-coloured birds that lived in flocks would immediately gather to mourn their fallen mate, becoming easy targets for the shooters. With their green, yellow and orange hues, these birds were also hunted for their plumage to use as hat accessories or brooches.

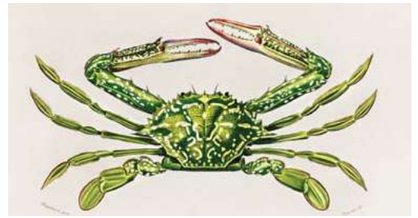
To lay to rest the speculations about its demise, researchers sequenced the genome of the parakeet, taken from specimens that were preserved in a private collection in Spain. As the DNA was too fragmented, scientists first sequenced the genome of its closest living relative, the South American Sun Parakeet. The analysis revealed that there was no inbreeding in the bird, which would otherwise have led to a slow decline in population. Though there were no markers of diseases transmitted by domestic fowl, illnesses could not be ruled out. Ultimately, researchers concluded that the suspicions were right – it was direct and indirect human activity that caused the extinction. Such studies are most useful in shining a light on human behaviour and impact on biodiversity.

A NOT-SO-DELICATE FLOWER

The hard-shelled *Portunus pelagicus* has a delicate name – flower crab! This crustacean is native to the Indian and Pacific Oceans, and also the Mediterranean Sea.

The male has white spots on a bright blue body, and the female is a dull green or brown. The female finds shallow marine habitats to lay and hatch her eggs. Estuaries are important for the survival of these crabs – newly hatched larvae swim into estuaries for food and shelter, which is crucial for their growth and development. Their anatomy is characterised by long chelipads, or clamps, which are enlarged front legs and are meant for grabbing prey. Males have longer chelipads than females. Also known as the blue swimmer, these crabs have a round body that is between 5-20 cm. wide.

Flower crabs stay buried in mud or sand for extended periods, primarily during the day. These little 10-legged creatures emerge from their subsurface lair during high tide to feed, especially on bivalves and small fish, and sometimes macroalgae. However, they cannot stay out of sea water for long. Endowed with a pair of flattened, paddle-shaped legs, they are excellent swimmers. Some of their characteristics such as high tolerance to ammonia and nitrate and the rapid growth of larva have made flower crabs a widely fished species in Australia and Asia.



PUBLIC DOMAIN/JACOB STUDER

Did You Know?

Apart from polar bears, Ussurian tube-nosed bats Murina ussuriensis *are the only known mammals who use snow igloos to hibernate. The high air content in snow makes it a better insulator than the exposed trees in winter. These four-to-eight gram bats, found in Siberia, Korea, and Japan, are the first known instance of bats snuggling in snow igloos for their winter slumber.*

WOLVES IN OUR MIDST

Myth and fiction are replete with appearances of this wild mammal – the wolf. Children's stories such as *Little Red Riding Hood* and *Three Little Pigs* feature the wolf as a villain. The wolfpack is an integral part of Mowgli's life in Rudyard Kipling's *The Jungle Book*. And as apex predators, wolves play a lead role in maintaining a balance in the ecosystem that they are a part of.

There are two subspecies of this dog-like, non-domestic carnivorous animal – the grey or timber wolf *Canis lupus*, which lives in the northern hemisphere, and the Ethiopian or Abyssinian wolf *Canis simensis*, which lives in the highlands of Ethiopia. The rippling, muscular body of the wolf is built for travel and high-speed chases. It can run at 60 kmph. because of its large feet, long legs and narrow chest. Its sharp senses and powerful jaws make it a strong predator.

An interesting aspect of a wolf's life is pack behaviour. These social animals live in packs of six to 10 individuals that hunt, play, travel and live together. A pack bands together to hunt large ungulates such as elk and moose, but they also feed on smaller animals like snakes and birds. An adult wolf can eat up to nine kilogrammes per day. The dominant male and female of the pack are the only members who breed, while others care for the pups.

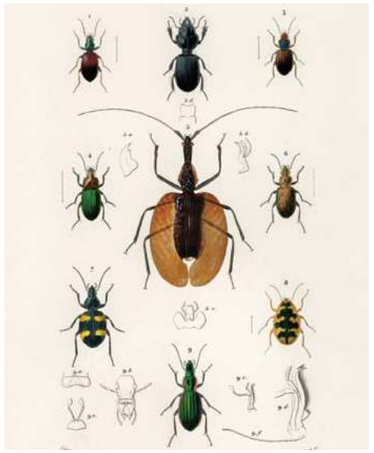
As ferocious and scary as they are, wolves are not known to attack humans often. They do, however, attack domestic animals, and have historically been culled across North America for it. In India, about 400-1,100 wolves live in the Himalayan region and 4,000-6,000 in the peninsular region. The Indian wolf *Canis lupus pallipes* mostly lives outside Protected Areas and is often in conflict with humans due to its livestock predating habits; it is also scavenger.

WIKIMEDIA COMMONS

THE MUSIC BUG

What one could mistake for a papery seed likely to get swept up in a wind gust is actually a species of ground beetle! And can the music aficionados here see the likeness of an instrument in it?

PUBLIC DOMAIN: WARNE



A violin, perhaps? Yep, the wings of this ground beetle are shaped like the string instrument, giving it the common name 'violin beetle' or 'banjo beetle' *Mormolyce phyllodes*. To be more specific, the elytra (forewings) of this beetle are shaped like the wooden instrument. Their leaf shape and black or brown colour makes a brilliant camouflage mechanism, an adaptation known as mimicry.

Peninsular Southeast Asia, Greater Sunda Islands and Borneo are home to all six known species of the violin beetle. The earliest species records of the varnish-coloured insect are traced to Java in 1825. This beetle has a long head and antennae, and spindly legs.

Its wafer-thin body allows it to hide in soil cracks and under the leaves and barks of trees. Its larvae live between the layers of the bracket fungus of genus Polyporus. The young and adult of this species are both predators and feed on insect larvae. It also secretes the pungent-smelling, poisonous butyric acid as a defence mechanism.

One species of this rare violin beetle was documented by entomologists after 67 years since it was first found. The *Mormolyce phyllodes engeli* thrives in the forests of the Philippines. Researchers noted that the six centimetre-long insect feeds on wild mushrooms and bracket fungi in the forest.

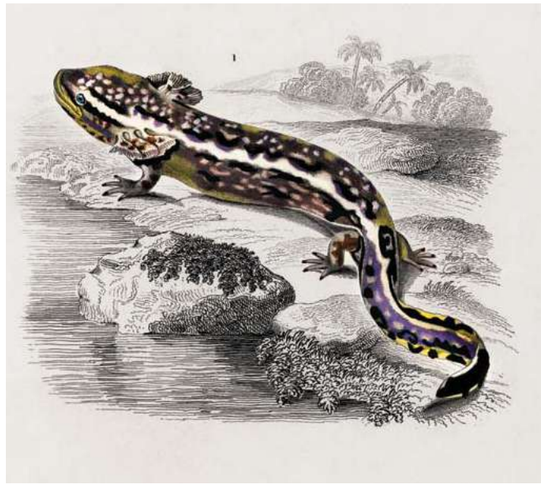
And no, the wind is not their mode of transport! Adult beetles fly from August and November.

Did You Know?

Small fruit flies Drosophila *are endowed with muscles under their compound eyes that enhance their depth perception and allow them to move their retina independent of their body. Usually, animals with compound eyes attached to an exoskeleton have to move their whole body to see. The fly's eye muscles suggest evolution similar to vertebrates that also move their eyes independent of their bodies.*

WHAT'S IN A NAME?

WIKIMEDIA COMMONS



What do you call a salamander that sounds like a dog? A mudpuppy or waterdog. However, the mudpuppy is erroneously named for the incorrect belief that it barks like a dog!

Necturus maculosus is a carnivorous amphibian that is usually around 28 cm. but can grow up to 40 cm. This salamander species gets its name because of its squeaky vocalisations that sound a little like a dog. Akin to a domesticated canine, mudpuppies have a collar – bright red, bushy external gills, which make it easily distinguishable. The gills grow when the species is still in its larval stage. The adult mudpuppy is grey to brownish-grey and has blurry blue-black spots. Its tail is wide, head is flat, and legs are stubby. The female of the species watches over her babies until they hatch, which is unique for salamanders.

Mudpuppies are found in southern central Canada and the United States. They are bottom dwellers, live at the base of rivers, lakes and ponds, and never leave water. They live under logs, rocks and in vegetation through the day, and emerge at night to eat sea animals like snails, worms, crayfish and eggs of other animals.

DEAD OR ALIVE

A single protein. That's all it takes to convert a thriving plant into a zombie plant.

When parasitic bacteria *Phytoplasmas* invades a plant, it sterilises the plant and at the same time attracts sap-sucking insects that will transport the bacteria to new hosts. The parasite turns flowers into leafy shoots, makes the petals green, and gives the plant 'witches' brooms', a strange mass of shoots. Effectively, the plant is alive only to hold the pathogen; it cannot reproduce, and cannot function as its normal self any more. The plant starts becoming yellow, and its growth is stunted. It is now a zombie plant.

But there's one more control that this clever bacteria exercises – over bugs that visit the plant. Researchers observed that in the presence of the protein, the plant became more attractive for leafhoppers, which transmit the parasite. The bug even laid more eggs on the zombie plant than a normal plant. Instead of killing the insect, which was crucial for propagation of the parasite, the bacteria's presence increased the survival of insect vectors.

Other parasites such as the rust fungus force their host zombie plants to convert their leaves into a bright yellow colour. These 'pseudoflowers' attract insect pollinators, which carry the fungal cells to new, uninfected hosts.

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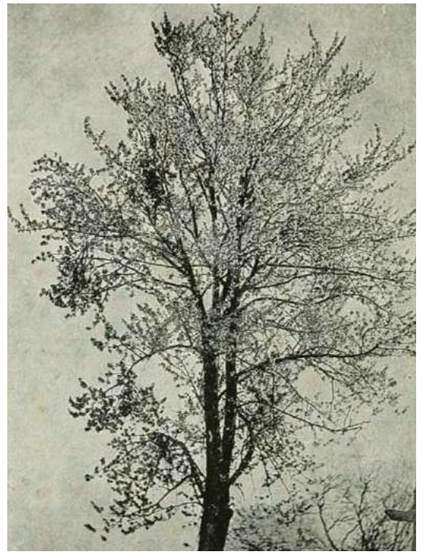


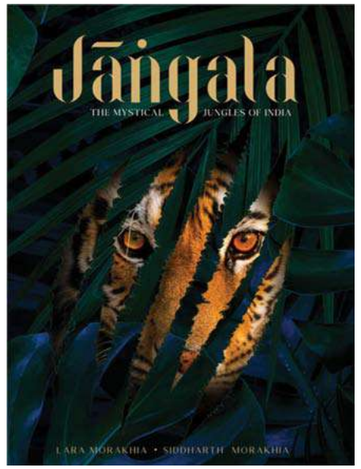
Did You Know?

DNA can survive for a long time in blowflies and flesh flies that feed on dead animals. They effectively carry a fast and inexpensive snapshot of mammal diversity from hard-to-reach spots of rainforests. The DNA can be sequenced to map biodiversity! Researchers could identify 16 mammals in Côte d'Ivoire using this cool technique. The status of endangered species can also be understood with this method.

BOOK REVIEW

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

> **"*Jāṅgala* –** *The Mystical Jungles of India* **is a testament to Indian heritage and luxury bookmaking."**



Jāṅgala – *The Mystical Jungles of India*

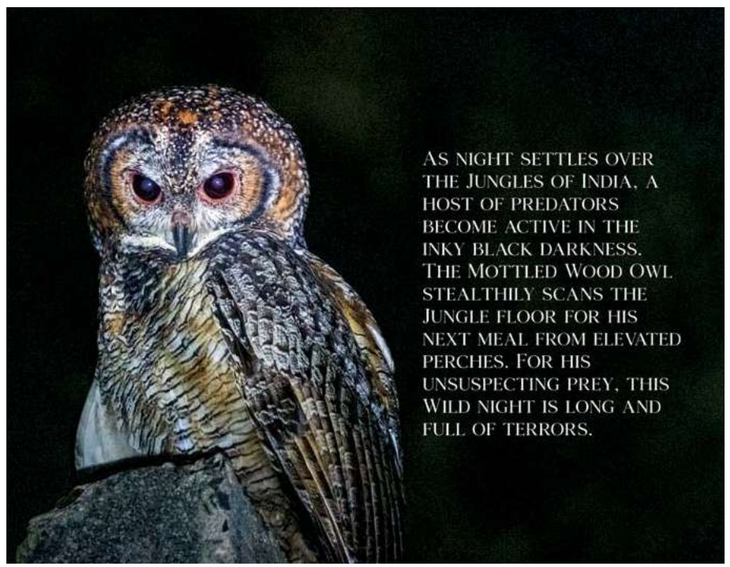
By Lara and Siddharth Morakhia
Published by Lara Morakhia & Siddharth Morakhia, 2021
Hardcover, 254 Pages, Price ₹ 29,759

There is no longer any doubt that wildlife protection is a matter of life and death. Not just for the wild species that have been the focus of conservationists down the decades, but for human beings who have so separated themselves from nature they consciously reject the reality articulated by Chief Sealth, leader of the *Suquamish* and *Duwamish* tribes:

"Teach your children what we have taught our children, that the Earth is our Mother. Whatever befalls the Earth, befalls the sons and daughters of Earth. We did not weave the web of life; we are merely a strand in it. Whatever we do to the web we do to ourselves."

But not everyone has forgotten!

As the editor of a nature magazine for over four decades, I see an uncounted number of books themed around forests and wildlife. But on poring over the labour of love titled *Jāṅgala – The Mystical Jungles of India*, I spent over an hour gazing in quiet wonder at the images of the stunning, large-format publication, and thought to myself that a kind of rebirth seems to be taking place. After decades of destruction (still ongoing at the hands of my generation, no doubt), the signs of change are palpable in the outpourings of the hearts and minds of our young. The large format images and the sensitive text that grace *Jāṅgala's* pages, put together by designer-author Lara Morakhia and her photographer son Siddharth, belong in public libraries, to fuel the imagination of the young who will need to negotiate a great U-turn, away from the destruction we have inflicted upon them, towards the regeneration and veneration of nature for which India was once justifiably respected.



The duo has chosen to focus, through five lavish chapters, on the national parks in Central, Western and Southern India. The images, design and production quality of *Jāṅgala* are of unsurpassable quality and I agree with Mridul Sawhney whose testimonial reads: "This is not a book, it is an experience."

Still pictures and moving words are packaged in a publication that reveal both physical and spiritual churnings. Writing about a leopard courting her mate, Lara writes, "the beauty of a female leopard is beyond captivating... she elegantly stretched her accordion-like body and acrobatically descended the tree to make her presence and mood clear to her mate."

Tigers are understandably given pride of place in the book, but in Kabini, the striped cat was clearly side-lined by Nagarahole's famous, melanistic leopard: "On one particularly heart-wrenching day, after the panther had been missing for nearly fourteen days, we occupied ourselves with a sighting of a tiger relaxing on a nearby *bund*."

And then, when the duo finally meet their quarry: "As we laid eyes on him for the first time, all the foregone sightings and days of anticipation melted away from memory. Standing in front of us was a surreal sight; a black cat illuminated solely by a pair of golden eyes under the harsh afternoon sunlight. He gave us a cautious and confused look as a small fragment of leaf settled atop his crown... Euphoria."

The book, printed by Pragati Offset, Hyderabad, deservedly won a PrintWeek 'Book Printer of the Year 2022' award for its technically brilliant execution involving gold screen printing, hot foil stamping, spot gloss UV varnishing and metallic beige ink for section markers and its high quality hot-foil stamping. But in my book, it's the quote from Toni Morrison that Lara and Siddharth Morakhia chose for their epilogue that won the day:

"At some point in life, the world's beauty becomes enough."

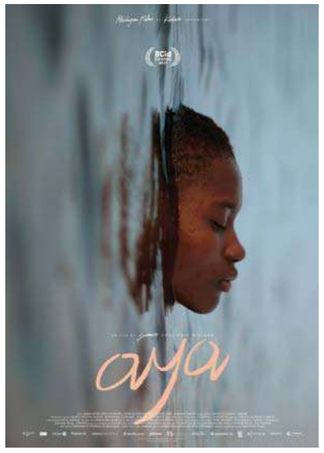
Reviewed by Bittu Sahgal.

FILM REVIEWS

The third edition of the All Living Things Environmental Film Festival (ALT EFF) 2022 ran from November 17 to 27. Sanctuary's editorial team watched and reviewed 10 of the 55 films in the programme, of which 33 were exclusive India premieres.

The films were categorised according to themes such as conservation, climate change, activism, the ecosphere, indigenous wisdom, urbanisation, food politics, capitalism and sustainable living. Each offered the opportunity to spend time contemplating the lives of all organisms on Earth – from plankton, rare birds, insects and jellyfish, to humans among others.

Naturalist, wildlife filmmaker and environmentalist Pradip Krishen was one of the distinguished jury members for this year's edition of the festival and he said, "It is so special to be part of a Jury that 'understands' cinema deeply, in all its nuances."



Aya

Directed by Simon Coulibaly Gillard | Côte d'Ivoire | 1 hour 30 minutes

Teenage years ought to be about a carefree spirit, a loving family, and as one grows older, a childhood sweetheart. Aya, a young girl in Lahou, an island town in the West African country of Côte d'Ivoire, has all these but with a foreboding twist.

The sea is coming, creeping up the shore, not even sparing the departed resting in the cemetery. The very sea, which was an ally, is now threatening their very existence.

Without raising the alarm about climate change and its direct impacts on human lives, the Belgian film is a heartbreaking story of how the poorest are losing the most as the sea rises. Aya, her mother and baby brother, a small family unit, live by the sea, where plastic is as much a part of the landscape as beach sand. Food resources are strained further, jobs are few and far between, and their homes will simply be swallowed by the rising waters. Aya is far too content, far too in love with her home by the crashing waves, and simply does not want to leave, even as she can see the sea taking bites off the land.

This feature film is a coming of age story in the age of the climate crisis, and a must watch for anyone who thinks about the world we are now living in.

Spirit of the Forest

Created by Nirupa Rao, Directed by Nandini Rao and Nirupa Rao | A Sacred Grove, India | 6 minutes and 50 seconds

How I would love to meet the Spirit of the Forest. That was enough of an invitation to watch the film, and its animation was just a cherry on top.

Sacred groves are dense, biodiverse patches of forests, which are protected for their religious significance by a community, a practice, which has protected these rich banks of native biodiversity.

This one is a special recommendation for children. In its short run time of six minutes and 50 seconds it captures the magic of the sacred grove, its importance, and the urgency to protect these little havens. The film shows the grove through vivid, beautifully animated panels, as the little girl takes a ride through its secrets, just like Alice in Wonderland.

The Seeds of Vandana Shiva

Directed by Camilla Becket and James Becket | Australia | 1 hour 21 minutes

"When you sell real weapons and arms, you control armies. When you control food, you control society. When you control seed, you control life on Earth." – Dr. Vandana Shiva, Sanctuary Lifetime Service Award 2018 winner.

If there is just one thing you take away from this film, I think this should be it. Or the strength and energy that radiates from Gandhian eco-activist, Dr. Vandana Shiva. Or, speaking of Gandhiji, his oft-repeated thought that influenced resistances across the globe – "Be the change you want to see in the world". Dr. Shiva is an embodiment of this ideology, and hearing about her life's work, never again would one raise the question "What difference can a single person make?". But with the all important caveat of identifying the interconnectedness and interdependence of life and nature, and the strength of like-minded, true voices.

Or... well, I really could go on about all the things one could learn from this power-packed, action-packed movie on the life of physicist Dr. Vandana Shiva, who studies, writes about and fights for the environment, water, rights of the people, and seed sovereignty, among other pressing issues of our times.

The film-makers have done justice to capturing the canvas of complicated subjects that Dr. Shiva has dealt with, which is likely to compel the viewer to dig deeper into the topics and question everything from global systems to the food on their plate.

Revival of Manas

Directed by Green Hub Fellows Rangjalu Basumatary and Nongmaithen Rocky Meitei | Manas National Park, Assam | 27 minutes

Serene, cinematic shots took me straight into the heart of the beautiful landscape and rich biodiversity of the Manas National Park in Assam. But where there are resources, there are people. The beauty of Manas and the wellbeing of its neighbouring human population are the results of an ingenious balancing of people's aspirations, their sensitivity to protect the environment, and even an armed political struggle.

The film tracks the destruction that Manas faced during the turbulent period of the Bodoland movement, showing how human political conflict can influence the fate of biodiversity. At the same time, the film Revival of Manas also brings to light a shining example of how community involvement can protect endangered oases. The film showcases the hard-fought victory of the Manas Maozigendri Ecotourism Society (MMES), a community-based society for conservation and ecotourism.

Imagine this – while people fight for their rights and lives, you have to convince them to think about endangered wildlife. That is the crucial role played by MMES for Manas, which you experience for yourself in this film.

The above four films were reviewed by Shatakshi Gawade.

❖ ❖ ❖

The Plastic Bag Store

Directed by Robin Frohardt | United States of America | 56 minutes

Plastic is ubiquitous; it has infiltrated our lives at a cellular level. Have you ever wondered about what a future in a world that is getting filled with more and more plastic everyday looks like?

The Plastic Bag store is an extremely creative and thought-provoking response to that question. It weaves timelines of past, present and future just as seamlessly as it brings together several art forms to explore rich themes related to our deep relationship to this material.

I really enjoyed the satirical tone of the film and its fresh aesthetic. It begins in a grocery store that exclusively serves up (you guessed it!)... plastic, but then the scenes change to an animated history lesson that explores the origins of our obsession with plastic, a stunning puppet show that manages to convey the alienation of our times, our careless ways and ends with a message in a bottle...without much needing to be said. It is in the futuristic scenes that the full power of this film comes through. It gives us an opportunity to look at ourselves and the times we live in as a mere footnote in history, and to imagine how humans many years from now might interpret the story of our civilisation based on our most enduring artefacts.

Chidiya, Pujara aur Solah Rala *Chor*

Directed by Milind Chhabra | India | 58 minutes

This beautifully made documentary about the role that *rala* (foxtail millet) plays in the culture, beliefs and livelihoods of indigenous communities in Central India strikes a fine balance between poetry and realism. Interviews with the few farmers who still cultivate local varieties of grains give the viewer insights into the importance of these plants to them, and reveal how the demand for capital has put enormous pressure on these communities and their way of life.

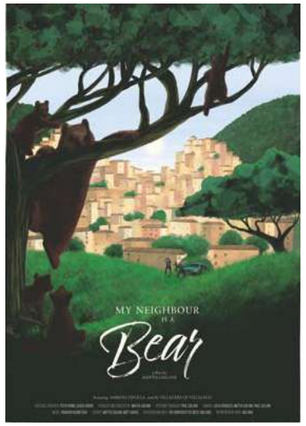
We hear stories of Goddess Kansari – goddess of foodgrain and fertility – who wears ornaments of rosella, corn, and the most valued and nutritious seeds in the community. The documentary features the folk musicians and artists who sing about her and paint her on their ochre walls, and they speak about her with a pragmatic reverence. As the documentary unfolded, I realised that this is not just a film about food sovereignty, but also about indigenous wisdom, climate change and the pressures of urbanisation. All of

these themes converge most memorably in the telling of the story that has given this movie its title 'Chidiya, Pujara aur Solah Rala Chor'.

My Neighbour is a Bear

Directed by Mattia Cialoni | Italy | 16 minutes

What would you do if you found out that you had as neighbours, not one, but five bears? When this happens to Sabrina in the charming village of Villalago, which lies at the foothills of the Abruzzo Appenines, she decides to make the most of this rare opportunity and spends all of her free time observing and documenting their presence in her village.



A heartwarming short that highlights the importance of citizen science efforts in conserving Marsican bears, of which there are just 50 remaining in the wild. It tells a simple and sweet story of how concepts of belonging and tolerance can be extended towards not just fellow humans, but wild animals too. I felt almost as excited as Sabrina every time the family of bears she had her eye on would show up on screen!

A Sacred Oasis on the Cusp of Change

Directed by BIONT | India | 8 minutes 52 seconds

Deg Rai Mata *oran* is a large sacred grove in Rajasthan. This short briefly acquaints us with the various wild residents of this vibrant, life-sustaining oasis in the desert and the villagers who protect this ecosystem as a way of life for centuries. Here, conservation is second nature to the villagers and they find joy in sharing their spaces with wildlife. They take immense pride in the fact that not a single leaf is cut inside the *oran*.

However, high tension power lines for a renewable energy project have interfered with the delicate balance of the sacred grove. Collisions with the tall, imposing structures have been causing wildlife injuries and deaths by the dozens. The villagers express their pain over no longer being able to guarantee guests such as the wintering Demoiselle Cranes from Mongolia a safe stay in their villages.

The sharp footage capturing interesting natural history moments of chinkaras, hares, foxes, desert cats, hedgehogs, spiny-tailed lizards, sand boas and a variety of birds in the Deg Rai Mata sacred grove made this short film a delight to watch.

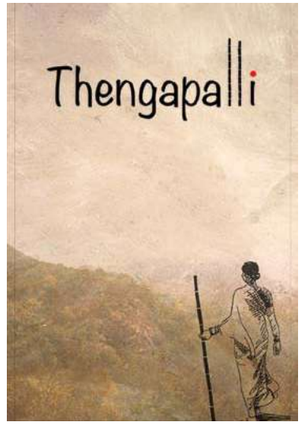
All That Breathes

Directed by Shaunak Sen | India | 1 hour 34 minutes

Nadeem and Saud are two Muslim brothers who, along with a young man called Salik, run a wildlife rescue centre in Delhi where they treat sick or injured raptors, mainly Black Kites that are falling out of the sky in large numbers owing to the highly polluted urban landscape they live in. Set against the backdrop of rising communal violence in Delhi in 2020,

we learn that the urgency of the brothers' work is tied to identity – kites are not accepted at bird hospitals for being 'non vegetarian'.

It is the camaraderie between the men and the surprising tenderness with which they care for the birds in a run-down, polluted city that makes this documentary so mesmerising to watch. The brothers speak about their larger-than-life connection to every being that breathes, their observations on how urban kites have been uniquely adapting to a difficult environment and on their dreams for the future. Some lines appeal directly to the heart, as when Nadeem says, "You don't care for things because you share the same country, religion or politics. Life itself is kinship. We're all a community of air. That's why we cannot leave the birds."



Thengapalli

Directed by Vandana Menon, Vivek Singh Sangwan and Debashish Nandi | India | 8 minutes 45 seconds

Thirty years ago, the women of the Gunduribari tribal village in Odisha grew sick of being bullied and harassed by the timber mafia looking to illegally extract teak from their forest. Fed up of being excluded from the decision-making processes regarding forest management practices in their locality, they decided to take matters into their own hands. In the absence of adequate government support, they formed their own forest protection team, taking turns to patrol the forests during the day and night. They have an efficient and decentralised system in place, thanks to which these degraded and barren lands have regenerated.

Though the *Forest Rights Act* (FRA) was passed in 2006, recognising the legal right of tribal communities to dwell in their traditional forest lands, the indigenous people of India continue to remain neglected by the state; their lands exploited by industries with vested interests. This short film gives us a hopeful glimpse into what a self-defined stewardship over land can look like, and shows us the true meaning of resilience. It is an inspiring example of community conservation at its best.

The above six films were reviewed by Francesca Cotta.

NETWORKING

Join *Sanctuary's* online network

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

@sanctuaryasiapage
@sanctuaryasiagroup
@SanctuaryAsia
@SanctuaryAsia

On Commentary 'Your Turn Next'

Nita Kapadia If they have survived for 10 million years, they are a successful species. Actually, they look as if their heads are attached to barrels. So, of course, I stared.

Rosabelle Wildlife Art Thank you for this informative post to raise awareness of these most intriguing cats. A successful species no longer guarantees future success.

THOMAS VIJAYAN

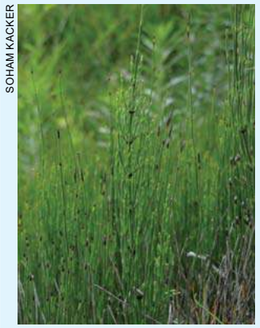
On 'Death Traps in the Desert'

COURTESY RADHESHYAM PEMANI BISHNOI

@nehaa_sinha Immense sadness washes over me as I see an ancient bird, here for centuries, being killed by something as mundane as a powerline. The GIB has now been pushed to a corner of Rajasthan and Gujarat. Only one thing can help it now: strong political will that takes wires underground.
@Yatrik_buch Will only exotic cheetahs get the money?
@Gopalsinhjidesai The same thing happened in Gujarat. We now only have females left.

On 'Living Fossils'

SOHAM KACKER



@indian.gardener Sixty per cent of coal is equisetum? That's fascinating.
@sohamkacker They are the single most abundant Taxon represented in coal pit fossils!
@neelamsri20 You amaze me Soham with your vast knowledge. So informative and makes one look at weeds with a new lens.
@Elolalexandre "To the size of buildings" really gets me dreaming! They make a really nice sound too as one pulls them apart, tube by tube. But they feel so precious now, next time I will just let them be!
@Sangeetaamkhanna You brought back some botany lessons from university days. Beautiful image.

On the Amur Falcon' migration in our Photofeature

@Bernardvanelegem Absolutely amazing phenomenon! Must be fantastic to witness this.
@The_future_of_trees What a great image!

DR. ANISH ANDHERIA

READERS' FORUM

On Sanctuary

Much before we knew about conservation, we started reading *Sanctuary Asia*, in its earlier avatar, A5 size in our school library. You have been a great inspiration. I want to involve my son Ehsaan who is all of 13 years and has shunned single-use plastic all his life.

Dipankar Ghosh, Delhi

I was in grade 10 in 2000, when I first wished to buy *Sanctuary Asia* but I could not afford it then. I read the issue in the library when I could and it transformed my life. After two decades, I became a Project Head at the Sanctuary Nature Foundation. I never imagined a boy from Pampore – saffron town – will be J&K's project head. The journey under the mentorship of Bittu Sahgal has been one of the finest experiences of my life.

Nadeem Qadri, J&K

MURTUZA CHHIL

On 'Food for Thought'

Love the unique concept. This ensures that the traveller gets the complete experience of deep diving into local cultures and cuisines, and makes sure the traveller takes back something special from their travel.

Adventureseekers.in, Pune

On 'Healing Hills of Himachal'

Divyakshi Gupta is a phenomenal writer and inspires me constantly with her strength and zest for life. Her latest piece on healing and slow travel in October 2022 is beautiful.

Abinaya Kalyanasundaram, Chennai

On How Not to Be a Tourist – 'Not a Prop'

My heart breaks every time I see these inhuman activities being meted out to these creatures.

Mitu Guha

How can they call it a tiger temple? Horrible, disgusting and utterly pathetic! The only way to ensure such hellish places cease to exist is to stop visiting them.

Niranjan Baravani

There are official tiger parks in Thailand even today. Large tourist companies take hoards of visitors to these parks. Such companies should be equally fined and banned for promoting animal cruelty. And how are zoos and animal shows any better?

Aditi K.

There is a serious ignorance among tourists. They feel they are helping by offering food. These kinds of activities can be drastically reduced if local tour operators are trained.

Ravikiran Patel

Tour operators and tourists should both be responsible citizens and refrain from such activities.

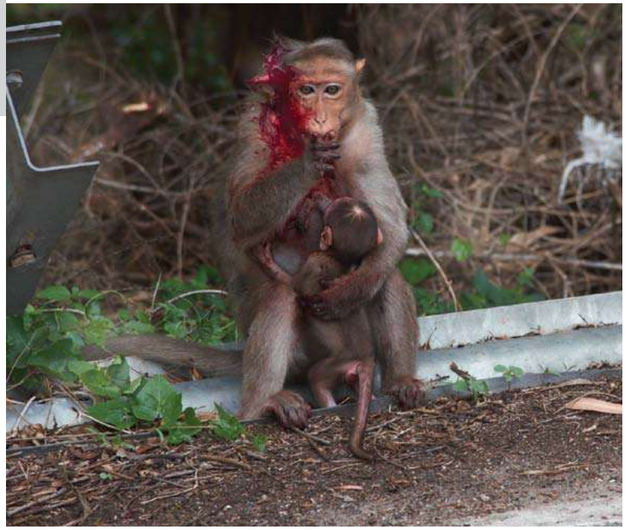
Hari Gopalakrishnan

On 'Hit and Run'

This is certainly not an isolated incident and while the image is poignant and powerful, this scene plays out literally thousands of times around the country every single day. Accustomed to human food, there are increasing incidences of macaques snatching things out of people's hands, vehicles and shops as well. It's a long and uphill battle to prevent these incidents. What is really required is communication and enforcement to stop people feeding wild macaques on roadsides.

Abhik Palit, Mumbai

AUGUSTIN S. P. / SANCTUARY PHOTOLIBRARY



On 'Equisetum'

It is a fascinating plant, a real survivor and in its own way elegant… unless like me, you have it in your garden and then it can be a pain. I did see it in the Birmingham Botanical Gardens where it has invaded some areas as it is almost impossible to get rid of.

Monique Gudgeon, United Kingdom

On 'Hunter in the Mangroves'

Unbelievable frames from the mangrove land.

Mainak Ray, Bengaluru

Sudipta Saha's hard work and perseverance paid off.

The GameDrive.co

IN OUR NEXT ISSUE…

TRAL: A NEW GEM IN J&K

About 45 km. from Srinagar, the picturesque Tral Wildlife Sanctuary offers biodiverse habitats ranging from riverine and coniferous forests to alpine scrub and treeless pastures. These are home to species as varied as the hangul, musk deer, leopard, wolf, and black and brown bears. **Intesar Suhail** and Dr. **Asad R. Rahmani** write about this little-known sanctuary that they say is a must-visit for wildlife lovers.

INTESAR SUHAIL

TAMAGHNA SENGUPTA

ELEPHANTINE PROBLEMS

Prachi Galange curates heart-wrenching images of Asian elephants from around the subcontinent that highlight the challenges these gentle giants face in the age of the Anthropocene.

Author's Speak

Article: Food for Thought

A long-standing dream of writing for *Sanctuary Asia* was finally fulfilled. Thank you for publishing my article on culinary/food tourism in India, in *Sanctuary's* October 2022 issue.

Jayesh Paranjpe, Western_Routes, Mumbai

Article: Starting a Safari Tour Outfit in India

What a crazy few years it has been… it doesn't seem very long ago, when sitting in an office, I had pondered whether I could truly make something out of that lifelong itch to be in the wilderness, to view and observe wildlife as much as I could. Years and years of second-guessing myself, and then in 2018, I jumped off the springboard to depths unknown. Yet here I am today, thanks to the constant support of my wife Deepi and my family, doing what I scarcely thought was a real-life possibility. So, it seems hard to describe what I feel, when four years later, the publication I grew up with, that fuelled my passion for the wild, would have the story of our journey dotting its pages. Incredibly thankful and honoured for this privilege. Special thanks to @camperscampersstudio for shooting some wonderful images.

Shashank Birla, Mumbai

Article: Living Fossils

This innocent little roadside weed (as it's appearance would suggest) is an incredible living fossil, nearly 380 million years old! *Equisetum* (literally Latin for 'Horsetail') is the evolutionary descendent of a long line of simple, fern-ancestors. During their peak, horsetails in tepid, pre-historic peat bogs died and formed around 60 per cent of the coal we burn today.

Soham Kacker, U.K.

Article: Kanha – Teeming with Wildlife, Not Tourists

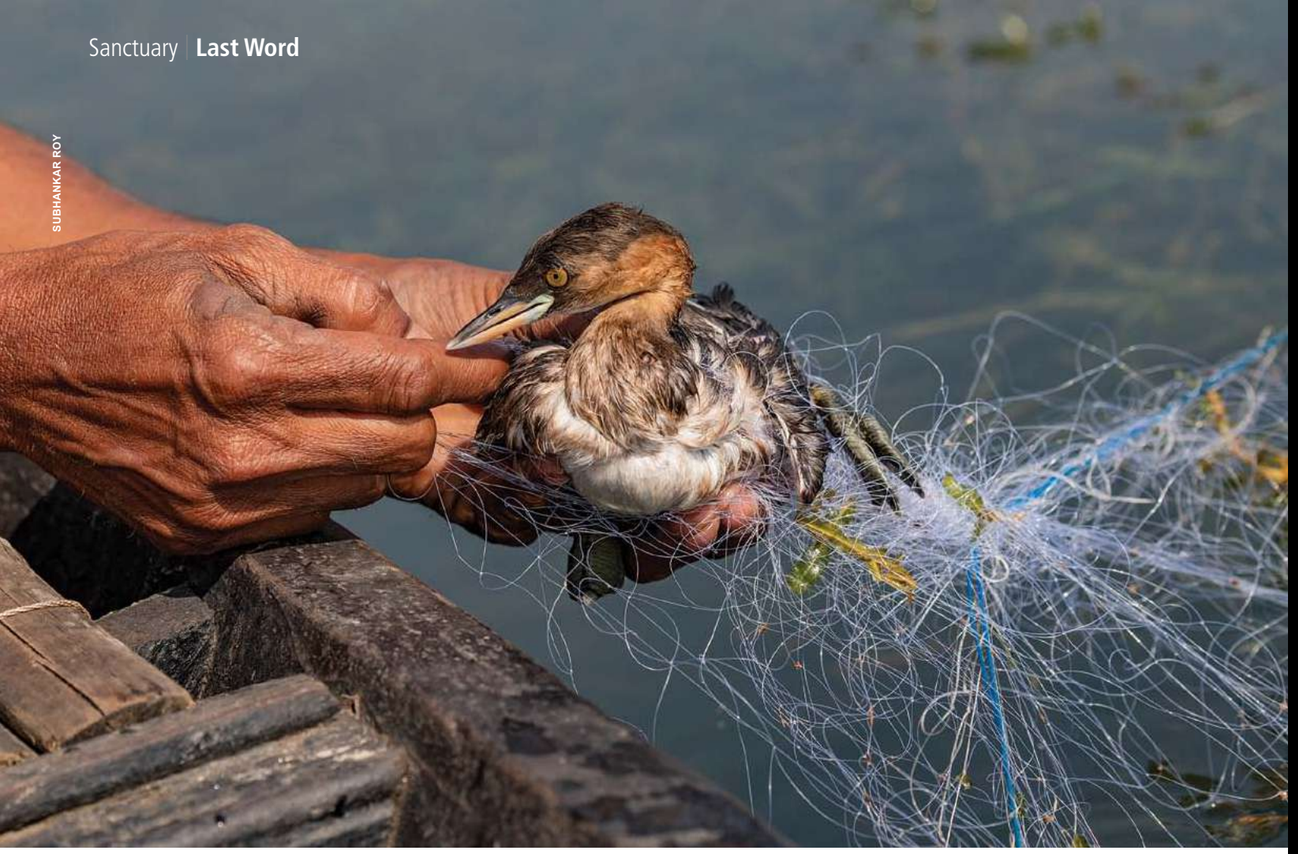
The whole issue is so wholesome. Congratulations to *Sanctuary* and your wonderful team.

C. Gangadharan Menon, Mumbai

ABHILASH KAR/ SANCTUARY PHOTOLIBRARY

Errata

In *Sanctuary's* October 2022 issue (page 67, top image), the scientific name for Rusty-cheeked Scimitar Babbler was incorrectly mentioned as *Pomatorhinus horsfieldii*. The correct scientific name is *Erythrogenys erythrogenys*. On page 60, the opening image should have been credited to Kedar Bhide and on page 62, the image on *Gond* cuisine should have been credited to LWF. We apologise for these oversights. – *Ed.*



SUBHANKAR ROY

ENTANGLED!

By Bittu Sahgal

A fabulous wetland called Chupi Char has become a veritable magnet for birders and bird photographers in the know. Created by a relatively small (3.5 sq. km.) oxbow lake fed by the Ganga, it is located in Purbasthali in West Bengal's Bardhaman District.

A panoply of birds of all hues and sizes, including kingfishers, herons, egrets, ibis, wigeons, pintails, coots, jacanas, wagtails, sandpipers, pochards and more are to be seen here. Predictably, the waterbody gets crowded in winter when resident avians must share the bounty of their home with fliers from the cold north. At this critical staging point, the foreign travellers will rest, feed and many will move further south in search of richer pastures.

At one time, trapping these birds in nets, to sell or consume, was routine. Today, as in Odisha's famous Chilika Lake, many boatmen who know the wetland well make a far better living by showcasing their winged guests to a generation of Indians who have woken to the joys of birding. The young take greater pleasure in communing with nature rather than consuming it ceaselessly.

And as COP27 winds down (see page 44), youth have begun to name and shame elder after elder as they cold-bloodedly wrap the biosphere in heat traps from which escape gets more difficult with every passing day. Tragically, this lethal heat-trap is being nonchalantly scattered across our ageless biosphere by the same elders who profess to love their young, yet think little of entangling them in ways from which escape will be far more deadly. They would do well to take a cue from this large-hearted boatman who carefully snipped his net, cleaned the bird, then watched with delight as it flew to freedom.

PHOTOGRAPHER: Subhankar Roy
LOCATION: Chupi Char, West Bengal
DETAILS: Camera: Nikon D500, Lens: Nikon 70-500 F/2.8, Shutter speed: 1/1000 sec., ISO: 250, Aperture: f/5.6, Focal length: 70 mm.
DATE: March 15, 2022, 2:12 p.m.

Sanctuary Asia

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