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Special Issue

DISCOVER JAMMU, KASHMIR AND LADAKH

CONSERVATION AND COMMUNITY

A Participatory Approach in Ladakh

KASHMIR IN FOUR SEASONS

Transitions in Life and Hues

BEYOND DACHIGAM

Habitats and Destinations

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

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SUHAIB FIRDOUS YATOO

A naturalist, amateur taxonomist and photographer, he is Director of Research at the Centre for Biological Diversity, Wildlife Conservation Fund, J&K. He received the Sanctuary Young Naturalist Award 2020.

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SIMON DELANY

An English ornithologist and environmental consultant living in the Netherlands, he spent his teenage years training as a bird ringer. He is currently finishing a Ph.D. on migration strategies of birds in Ladakh.

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DHRITIMAN MUKHERJEE

An accomplished and widely-travelled wildlife photographer and explorer, he has won the Carl Zeiss Conservation Award for his work. He is also the co-author of Magical Biodiversity of India.

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PHUNTSOG DOLMA

A Flock Supervisor at the Sheep Husbandry Department at Leh, Ladakh, she receives funding support from Sanctuary's Mud on Boots Project, as a Project Leader and is being advised by Munib Khanyari.

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June 2021

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On the cover

On an eight-day trans-Himalayan trek from Kibber, Spiti, to Karzog (Tso Moriri) in Ladakh, the photographer spotted this rare Eurasian lynx *Lynx lynx*, camouflaged amidst boulders. Called *Eeh* in Ladakhi, this regal, medium-sized wild cat that inhabits rocky-steppe and temperate forests up to altitudes of 5,500 masl. sports distinctive black tufts on its ear tips.

Photographer: Yogish Holla

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Seeding Conservation through Community Action

In Ladakh's cold desert landscapes, wildlife and humans live in a wary, delicate truce. **Ajay Bijoor,** Assistant Programme Head of the High-Altitude Programme at the Nature Conservation Foundation (NCF), writes about a participatory approach to maintaining the status quo that permits both parties to thrive in the Union Territories of Ladakh and Jammu & Kashmir.

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Bittu Sahgal,
Editor, Sanctuary Asia

My Kashmir Obsession

For four decades the rutting calls of hangul deer have repeatedly drawn me to the Kashmir Himalaya… like an iron filing to the magnet that is Dachigam, the only place in the world where the hangul deer you see on this page still exist.

Soon after the inaugural issue of *Sanctuary Asia* was published in 1981, I met the late Mir Inayat Ullah, Chief Wildlife Warden J&K, whose love for wild India was matched by his love for the traditional communities that lived in and around the wilderness he lived to protect.

Aware of my love for Ranthambhore, one of the first things Inayat said to me was: "You cannot claim to have experienced a true Indian wilderness until you have walked the wilds of Dachigam."

Inayat was right. He would leave me in the care of late Qasim Wani, mentor and guide, who lived and died a forest guard, protecting Dachigam long before India gained her Independence. Down the years, I would accompany Qasim and later his protégé, Abdul Rahman Mir, on a 20 km. trek from the thick oak and walnut forests of Lower Dachigam at 1,500 masl. to Upper Dachigam's azure alpine lake, Marsar, at 4,200 masl.

Older, but fitter, Qasim would stop frequently to allow me to catch my breath! Sometimes, at a *Bakarwal dera* (herders' camp), we would be offered bread that we would dip in buttered tea. Frequently, Qasim would ask me to scan the hills through my binoculars. If I saw nothing, he would gently point out a tiny spot that turned into a brown bear with cubs, or a hangul stag, harem in tow, when they would move.

At roughly 4,000 masl., a ritual halt involved sitting in silence, listening to the gentle hum of bees and beetles just before reaching the impossibly beautiful Sangargulu flower meadows. As we moved on, the whistles of marmots announced that rest was at hand. The treks that began in the morning, would see us pitching tents around 4 p.m. or so at Marsar, with slopes of rock and scree all around us.

After dark, Qasim and I would sit around a small fire fuelled by fallen wood. On his last trek, before Abdul Rahman took charge of me, he said: "Without these high-altitude meadows the hangul will die. When I am gone, promise me you will help Inayat *saheb* to protect both Lower and Upper Dachigam."

Qasim Wani gifted me my Kashmir obsession.

PHOTOGRAPHER: Pranay Chandra
SPECIES: Hangul *Cervus hanglu hanglu*
DETAILS: Camera: Nikon D50, Lens: Nikon 70-300 mm. f/4.0-5.6, Aperture: f/6.3, Shutter Speed: 1/2500 sec., ISO: 400, Focal length: 300 mm.
DATE: January 19, 2008, 2:30 p.m.

WORLD SCAN

RHINO NUMBERS RISE IN NEPAL

Nepal's population estimation of the greater one-horned rhinoceros suggests an increase of about 100 from around 650 to 750, since the last assessment in 2015. Over 90 per cent of Nepal's rhinos inhabit the subtropical lowlands of Chitwan National Park and the Bardiya, Shuklaphanta and Parsa National Parks. In India, the pachyderms are centred around Kaziranga, Orang, Pobitora, Manas, Dudhwa, Jaldapara, and Gorumara. Before habitat destruction led to their steep decline by the 19th century, the greater one-horned rhino was found across the northern parts of the Indian subcontinent, all the way from Pakistan to Myanmar. Nepal's Department of National Parks and Wildlife Conservation continues to recognise the need to expand the range of the rhino and has been assessing rhino populations every five years since 1996, when the record stood at 466. The recent assessment relied on observations by over 300 participants.

PUBLIC DOMAIN

Nepal's greater one-horned rhino population has risen from 466 in 1996, to 750 this year, according to population estimates published by the government every five years.

SAVING LIONS IN SOUTH AFRICA

South Africa intends to clamp down on the captive lion breeding industry after a review panel highlighted its adverse impact on conservation. The report followed a two-year study on threats lions face from hunting, and tourism that includes the highly discredited petting zoos. Barbara Creecy, the Minister of Environment, Forestry and Fisheries, announced that all recommendations stipulated in the report would be adopted by the ministry. "We don't want captive breeding, captive hunting, captive petting, captive use of lions and their derivative," she stated. However, the minister added that trophy-hunting of lions would be allowed to continue. About 3,500 lions have been recorded in the wild in the country while around 8,000 lions are part of the captive trade industry. The panel also recommended a moratorium on the trade in lion parts, and asked for strengthened protective measures for species such as leopards, rhinos and elephants.

PUBLIC DOMAIN

There are over twice as many captive lions in South Africa as wild lions.

ELEPHANT CONSERVATION WEAKENS

Elephant populations across the globe have taken a hit as both African and Asian elephants continue to fall victim to anthropogenic pressures. Zimbabwe, which harbours the world's second largest elephant population, has announced plans to sell the rights to shoot hundreds of elephants. The country is asking for between US$10,000 to 70,000 per animal, to make up for 'losses' incurred during the COVID-19 pandemic. Neighbouring Botswana, which hosts the world's largest elephant population, is also resuming hunting after a five-year ban. Between January and March 2021, over 100 elephants were killed in Sri Lanka – 21 from electrocution, 18 from eating explosive-packed bait, and 12 shot. Clearly human-elephant conflict is rising in Sri Lanka, where farmers have taken to hook their fences directly to lethal power lines.

SEA TURTLES ON THE BRINK

A report published in *Global Ecology and Conservation* noted a decline in western Pacific leatherback sea turtle populations, which are clearly headed toward extinction. Between 1990 and 2017, populations have fallen by 80 per cent. Marine biologists have called for immediate conservation measures, and have mooted international cooperation on the issue. Marine turtles suffer innumerable threats along their migratory routes. These range from drift and gillnet fishing, collisions with ships and death as bycatch. Equally lethal is the loss of nesting beaches and the uncontrolled toxic contamination of their waters. While populations of all leatherback turtle species are declining around the world, western Pacific leatherback numbers have plummeted to levels that actually threaten species viability. IUCN recorded 1,400 individuals in 2013, and predict that this could drop to 1,000 by 2030. Given that these turtles visit their nesting grounds only once in two to five years and tend to nest both in the summer and winter, scientists find it difficult to come up with accurate population estimates.

INDIA SCAN

DHOLE ESTIMATES IN WAYANAD

The Truth about Scats and Dogs, a study conducted by scientists from the Wildlife Conservation Society – India, National Centre for Biological Sciences, University of Florida, Kerala Veterinary and Animal Sciences University, and Stanford University have for the first time assessed the population and density of dholes *Cuon alpinus* in the Wayanad Wildlife Sanctuary. The team studied DNA collected from dhole scats across the sanctuary to identify individuals. Statistical models (Spatial Capture-Recapture) were used to estimate numbers and to map the density of the wild dogs. The study estimated that the Wayanad Sanctuary supported between 12-14.2 individuals per 100 sq. km. indicating that the total population was around 50 dholes. The study suggested that densities were greater in the drier parts of the landscape, at lower elevations. Interestingly, Wayanad also harbours a high density of tigers, indicating that the two predators can co-exist in ideal conditions.

CEC RULES AGAINST GOA PROJECTS

In a major ecological victory for Goa, the Supreme Court's *Central Empowered Committee (CEC)* ruled against the three linear infrastructure projects proposed in the Mollem National Park and Wildlife Sanctuary. The CEC recommended that the railway double-tracking plan be scrapped, the Tamnar transmission line be shifted to a route that would not involve further deforestation, and that an Environmental Impact Assessment (EIA) be conducted, incorporating plans for overpasses for safe wildlife passage if the project proponents wished to obtain approval for widening of the national highway. India is still not aware of the value of roadless, wildernesses; however, the order does represent a win for the Indian conservation community, which had been campaigning against such ecocidal proposals. The CEC order submitted to the Registrar of the Supreme Court on April 23, 2021, reads: "CEC does not find any justification for undertaking a project of this nature, which will destroy the fragile ecosystem of the Western Ghats…".

PUBLIC DOMAIN/CAJETAN BARRETTO

The Supreme Court ruled against three proposed infrastructure projects in Goa.

FOR REPRESENTATION ONLY/ PUBLIC DOMAIN

Dholes receive legal protection as a Schedule-I species, under the Wild Life (Protection) Act, *1972 and are listed as Endangered by the IUCN Red List.*

HUNTING IN WEST BENGAL

The Human and Environment Alliance League (HEAL) worked with the local Forest Department and police to curb mass wildlife killings and seize carcasses across forests in West Bengal at several hunting festivals in April 2021. Both tribal and non-tribal locals took part in the hunt that was largely recreational, suggested HEAL. On April 13, instead of the usual 12,000-15,000-strong crowd, only about 1,000 hunters managed to reach the Pakhibandh hunting spot, because check-posts manned by a 45-member team had been set up. That day, no kills were found at the congregation point where hunters generally gather after capturing wildlife. On April 19, around 3,000 hunters entered the forests at Arbari and Jaypur, and slaughtered wild pigs, monitor lizards, bats and several other species. On April 21, as many as 2,500 people again entered the forest at Tamakbari and Gopegarh, snaring birds including Black Francolins and Indian Pittas. Over 100 animals were later seized by the Forest Department. Apart from the killings, HEAL points out that the hunting festival posed a major public health concern, as super-spreaders for the COVID-19 virus.

NEW MAMMAL DISCOVERED

A new species of shrew *Crocidura norcondamica,* has been discovered in Narcondam Island in northern Andaman, making it the first insectivorous mammal to be discovered in India since 1978, when the Jenkin's Andaman shrew was discovered in South Andaman. A team from the Zoological Survey of India (ZSI) discovered the shrew on the uninhabited, volcanic island. Almost the size of a house mouse, the grey, insect-eating mammal is a forest-floor dweller and its discovery brings the total of mammals documented in India to 422, which includes 11 shrew species. Scientists point out that shrews play an important role in controlling insect populations on the island. Studies on the present status, including taxonomy, ecology and distribution, of the species are yet to be undertaken, and are vital to the drafting of an effective conservation plan. "The new species shows substantial genetic differences with other shrew species earlier discovered from India, Myanmar, and Sumatra," comments Shantanu Kundu, a scientist with the ZSI.

CLIMATE WATCH

CARBON SINKS TO CARBON EMITTERS

A study by Australia's Griffith University published in *Global Change Biology* in February 2021 identified six mangrove-rich regions worldwide as future hotspots for carbon emissions, owing to anthropogenic pressures on these carbon sinks. These regions recorded mangrove areas of 500,000 hectares or more, high carbon density (at least 500 megagram carbon per hectare) and high habitat loss (at least 0.1 per cent annually). Three of these regions are located in South and Southeast Asia, including the Bay of Bengal. The study looked at data for carbon stocks, mangrove distribution, deforestation rates and changes in land use, and included them in a model under 'business as usual' rates of mangrove loss and predicted that the six regions could contribute to 90 per cent of emissions in the future. The key drivers for mangrove loss included clearing of the coast, urbanisation, aquaculture, agriculture, erosion and climatic events.

AMAZON NOW CONTRIBUTING TO CARBON EMISSIONS

The Amazon rainforest, considered to be one of the world's top carbon sinks, released more carbon in the last decade (2010-2019) than it absorbed, according to an alarming study by the University of Exeter, Institut National de la Recherche Agronomique (INRAE) and University of Oklahoma. The study, published in *Nature Climate Change*, monitored satellite data from the past 10 years, and also found that degradation of parts of the tropical forest led to an increased amount of emissions. It was noted that 2019 witnessed a significantly larger rate of habitat loss (3.9 million ha.) as compared to one million in the previous two years, possibly owing to the wildfires that ravaged the forest that year. While deforestation rates were higher in 2019 than 2015, the latter saw a higher rate of degradation due to El Niño droughts, and carbon emissions that year were also higher, pointing to the dramatic impact of degradation.

PUBLIC DOMAIN/NEIL PAMLER

The Amazon forest produced more carbon emissions in the last decade than it absorbed.

PUBLIC DOMAIN/DAVID UNGER

A study by Australia's Griffith University has mapped six mangrove-rich regions around the world, including in the Bay of Bengal. These are in danger of turning into carbon emitters, owing to the severity of anthropogenic pressures.

THIRD MASS BLEACHING OF CORALS

The Khaled bin Sultan Living Oceans Foundation reported that the world's third mass coral reef bleaching event occurred in 2015. The report was a product of the five-year-long Global Reef Expedition led by the Foundation. The team observed how some of the most undisturbed reefs at the Chagos archipelago, Indian ocean, exhibited brilliant psychedelic colours (a sign of the chemicals produced when reefs are stressed) and then about a week later, turned white. This reduced live coral cover by five to 10 per cent. The bleaching at Chagos affected reefs spread over hundreds of square kilometres, and was triggered by a massive marine heat wave owing to an El Niño event, which affected reefs across the globe. Research shows that marine heat waves are 20 times more likely now than 40 years ago, and are longer and hotter than ever. The reefs of the Chagos Archipelago are home to at least 784 species of fish and 300 species of reef building corals, and comprise over 50 per cent of coral reefs in the Indian ocean.

GLACIAL MELT CAUSES RIVERS TO VANISH

As a warming planet causes glaciers to recede rapidly, scientists are recording the sudden disappearance of rivers and the consequent adverse impact on human communities that depend on them for survival. Regions that have been covered in ice for thousands of years are becoming ice-free, leading to the redirection of glacial meltwater into different watercourses. The first case of this phenomenon, known as river piracy or stream capture, was noted by Dan Shugar, a geoscientist at the University of Calgary, who observed the disappearance of the massive Slims river in just four days in 2016, because the glacier that had fed it diverted its flow into the Kaskawulsh river in Canada. More recently, a glacier, observed to be retreating at 10 m. annually, in the Glacier Bay National Park in Alaska, has been predicted to change the course of the Alsek river. The full impacts of river piracy is still unknown.

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Four Seasons

The Hues of Jammu, Kashmir and Ladakh

The British colonists described Jammu and Kashmir's climate as similar "to that of Switzerland until the end of May and Southern France in July-August".

In December, white flakes descend, covering every mountain and valley in a thick glistening cloak… the lakes and rivers glaze deep-blue. Some animals fur up in their own coats, some winter visitors arrive from afar, and others seek refuge underground. Over four months, the white ice thickens, then thins. As March approaches, it melts into an explosion of hues. Meadows turn green velvet, and mustard fields bloom. As do almonds and daisies and cherries and a host of other blossoms. Birds and squirrels have a feast. As spring moves to summer, the flowers become fruit. Lakes widen, rivers thunder, and glaciers melt. Come September, cicadas sing the arrival of *harud* (autumn in Kashmiri). And the forests are set aflame. Green leaves turn yellow and gold and then blush a lovely auburn.

And in a few months, all turns white again.

Seen here in mid-autumn, on the banks of the Neelum river in Gurez valley, Kashmir, are Himalayan birch Betula utilis*, deciduous trees native to the Himalaya. Found at altitudes of above 4,500 masl., birch trees have a range of traditional medicinal uses. Their bark was even used as* bhojapatra*, a paper-like surface upon which people wrote.*

DHRITIMAN MUKHERJEE

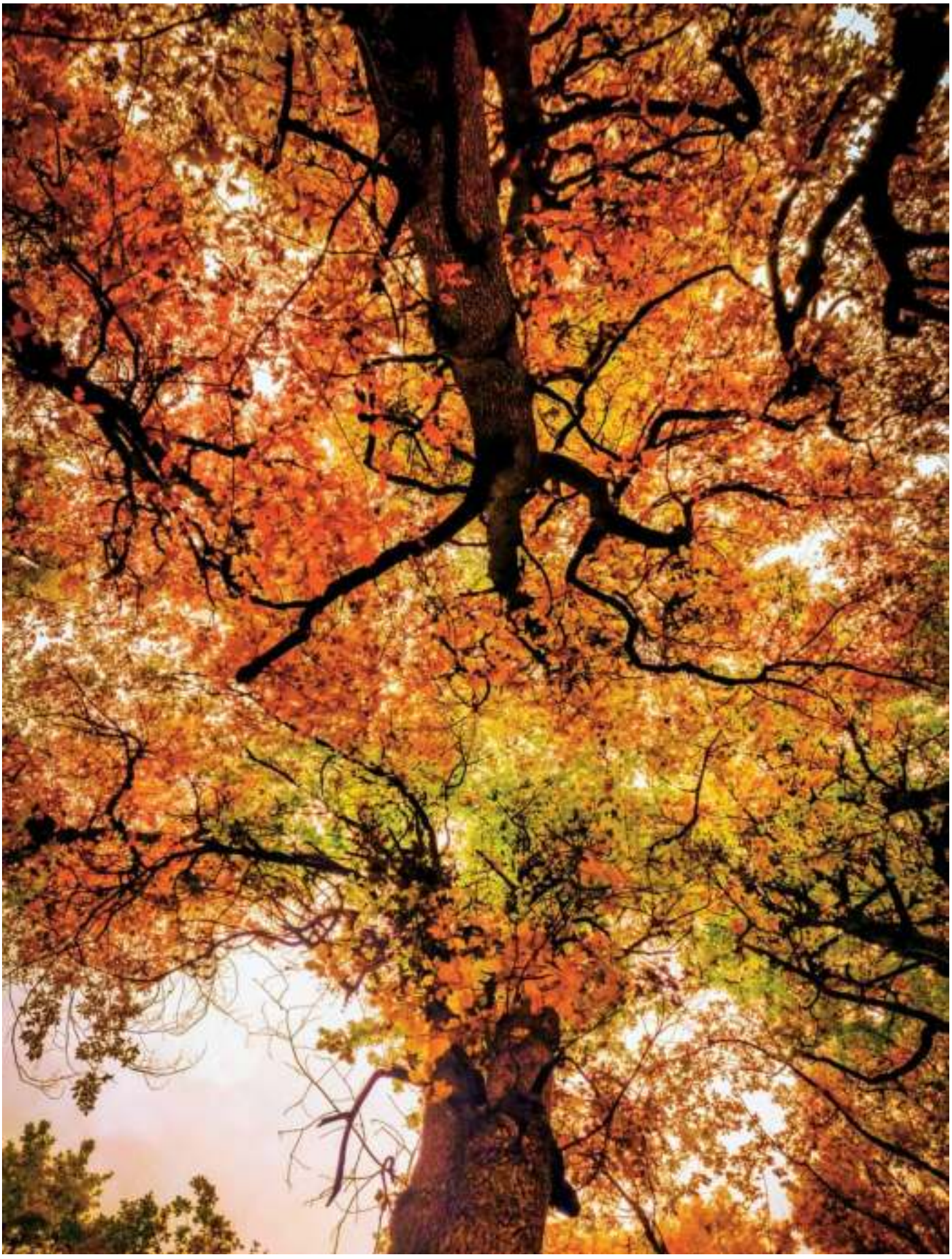
DHRITIMAN MUKHERJEE

ROUF RATHER

ABOVE *As autumn arrives, the rutting call of the male hangul deer* Cervus hanglu hanglu*, reverberates across Dachigam, the species' only abode. The calls fade out by mid-November, when the endangered deer return to lower elevations in anticipation of winter* *(see page 60)**.*

RIGHT *An Orange Bullfinch* Pyrrhula aurantiaca *proudly displays its colours that complement its surrounds. Males are more vibrant than females. This monotypic species is endemic to the western Himalaya. They prefer to flit around open coniferous forests where they pick at their favoured berries, buds, and seeds that are abundant during autumn.*

FACING PAGE *As days shorten and temperatures drop, autumn leaves begin to fall. These forests of oak, maple and walnut, with their associates, now undergo a marvellous transformation. Their green pigment (chlorophyll) breaks down, revealing underlying yellow (xanthophyll) and orange (carotene) pigments. In some species, such as the Himalayan maple* Acer oblongum*, locally known as* chinar*, and the mighty Himalayan oak* Quercus leucotrichophora*, leaves eventually turn red on account of the sugars and tannins trapped inside, which form anthocyanin.*



BILAL NASIR ZARGAR

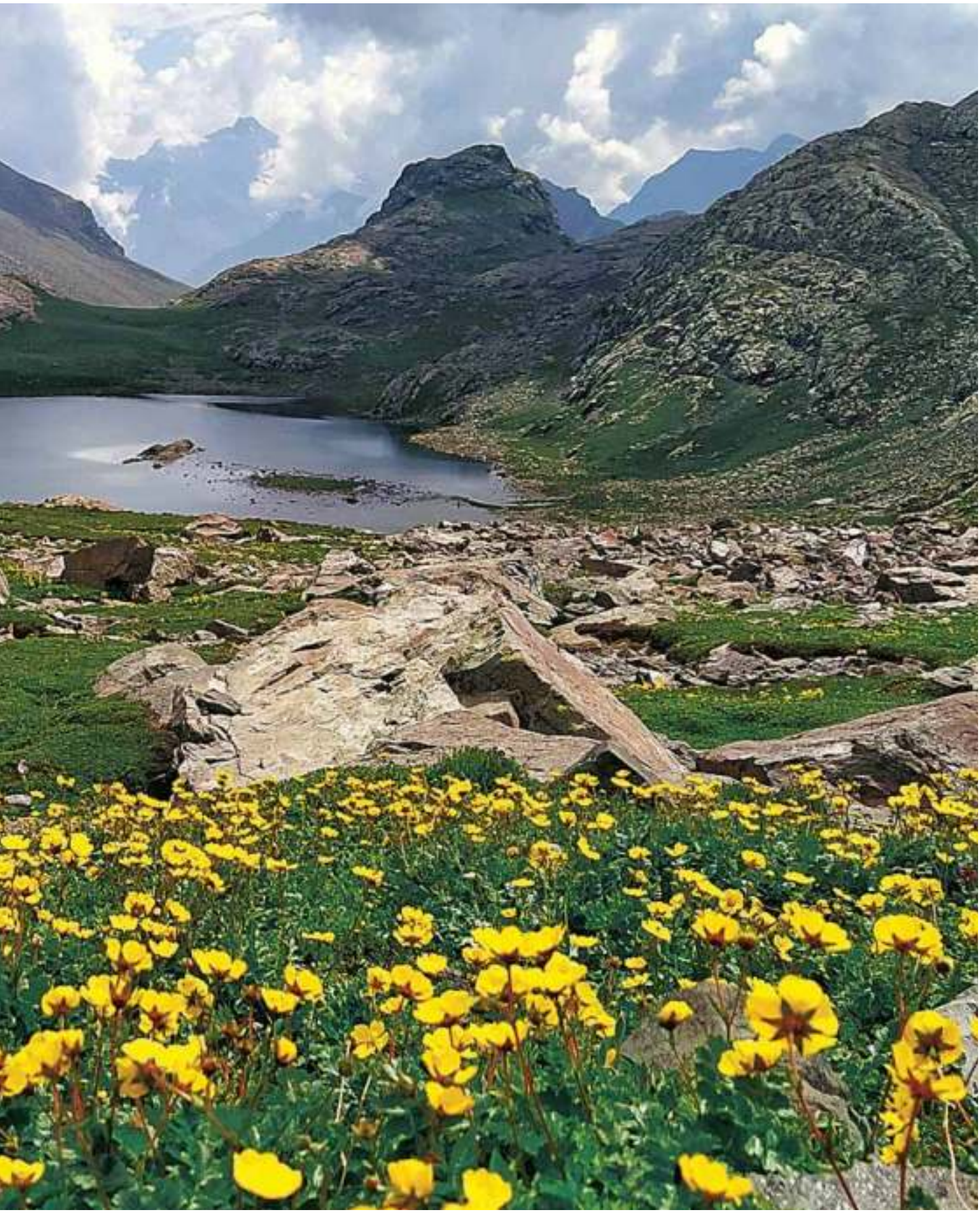
ANSAR AHMAD

ANSAR AHMAD

ABOVE *As migratory birds begin to depart at the onset of spring, a feast of blossoms help them fatten up for the long journey home. Meanwhile, birds such as orioles, cuckoos, nightingales and starlings return, after wintering in the plains… just in time to gorge on almond blossoms, yellow mustards, daisies and a host of other species that dot the landscape. Seen here, is a Rufous-breasted Accentor* Prunella strophiata*, distinguished by its rust-orange breast and grey eyeliner-like streak, amidst buds of* Viburnum grandiflorum.

TOP *Warming signals that spring has arrived and hibernating species, such as the Himalayan black bear* Ursus thibetanus laniger*, emerge from their winter dens. Succulent grasses, shoots of plants such as* Dipsacus *sp. now offer a veritable feast for the ravenous bears. In summer, they will consume copious quantities of insects and a variety of fruits – apricots, wild plums, rubus berries and more. They mate in the spring-summer months of June-July and their offspring are born during hibernation.*

FACING PAGE *With the advent of spring, winter-frozen glaciers begin to melt, feeding Kashmir's high-altitude lakes. The grass meadows surrounding them are now clothed in a riot of colours. Here we see the Sundarsar lake, in Aru, Anantnag district, clothed by sheets of alpine flowers such as the yellow avens flower* Geum *sp. Blooms including the exquisite blue poppy, potentilla and gentian also decorate the slopes advertising their existence to pollinators.*



ROUF RATHER

RANJITH KUMAR

Kashmir's heterogeneous mountain and valley habitats foster a rich floral diversity of immense scientific and economic interest. Spring and summer months are ideal to enjoy this floral abundance. The monkshood Aconitum *sp. blooms seen here at the edge of the Gadsar lake, flower between July and August.*

DHRITIMAN MUKHERJEE

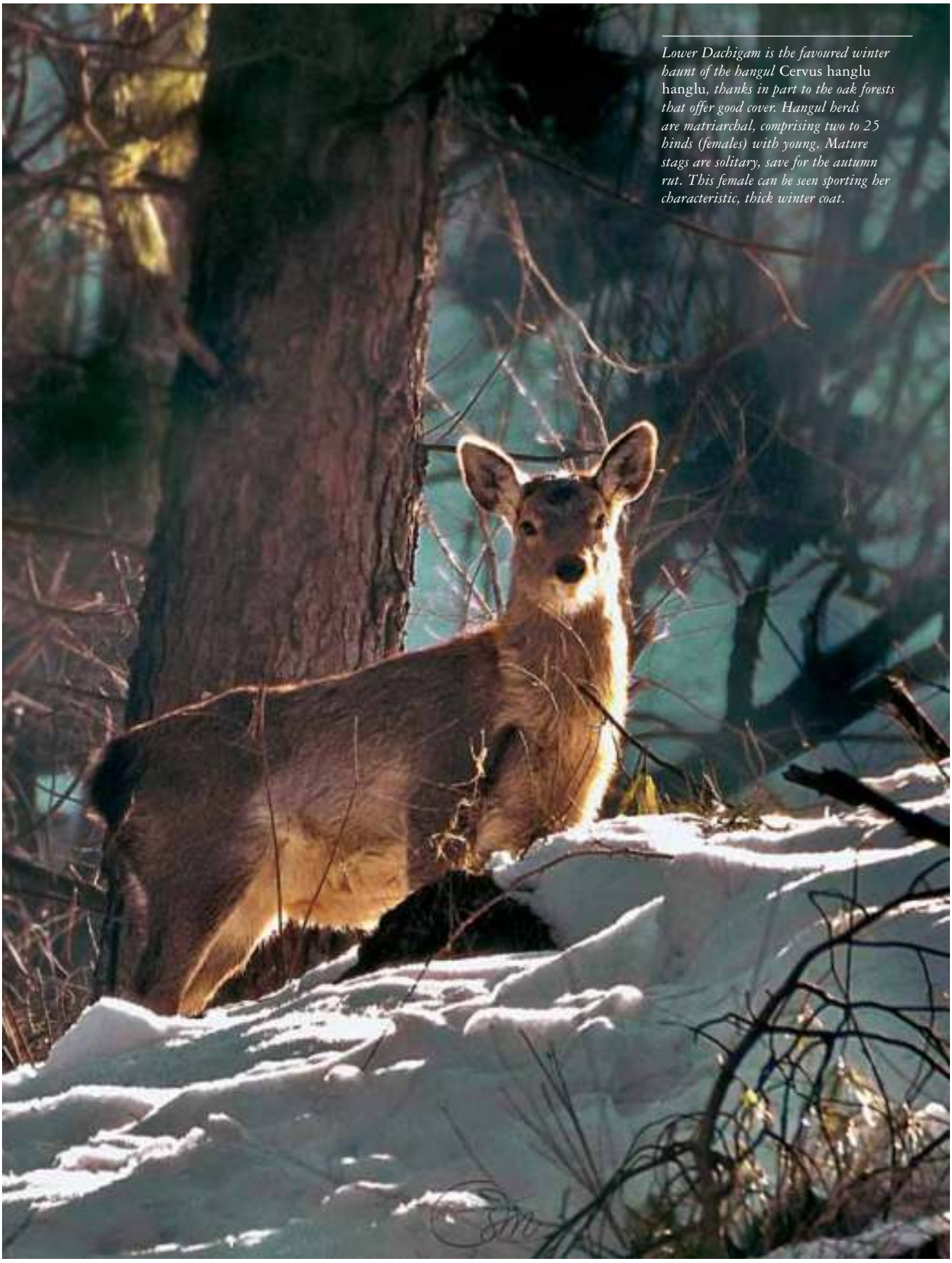
DHRITIMAN MUKHERJEE

ABOVE & TOP *The mammals of high-altitude Himalaya are well-equipped to handle winter temperatures. The Tibetan wolf* Canis lupus chanco, *photographed at Tso Kar, Ladakh (where temperatures can drop well below -23°C), is usually found at elevations above 4,000 masl., and is well adapted to this low-oxygen environment. The Rhesus macaque* Macaca mulatta *population photographed at the Kazinag National Park, similarly, has adapted to harsh climatic conditions, with thicker coats compared to other populations.*

FACING PAGE *Kashmir's trees have unique morphological adaptations designed to enable them to survive heavy snow. Evergreen pines have densely packed branches with tiny needle-like leaves to prevent water loss through transpiration. They also have a waxy coating of cutin to protect against freezing and dry winds. These trees can grow even in altitudes of 3,000 masl.*

DHRITIMAN MUKHERJEE

OVAIS SHAFI



Lower Dachigam is the favoured winter haunt of the hangul Cervus hanglu hanglu, *thanks in part to the oak forests that offer good cover. Hangul herds are matriarchal, comprising two to 25 hinds (females) with young. Mature stags are solitary, save for the autumn rut. This female can be seen sporting her characteristic, thick winter coat.*

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Seeding Conservation through Community Action

By Ajay Bijoor

SURYA RAMACHANDRAN

The sun was up but I could barely stop shivering. Winter winds that cut through the valley can be felt in your bones irrespective of your layers of clothes. We were in Tsaba, one of several small valleys in the region of Gya-Miru in Ladakh at 4,200 masl. We had walked some hours to reach a rickety hut deep inside the valley. "Time for butter tea," announced Karma Sonam, as he led us in. Karma *le*, our Field Manager, who lives in Rumtse village soon ushered us to a fire around which we huddled. Tashi Phuntsog, our host and local herder, answered our barrage of questions as he prepared our tea. Much of the conversation was in Ladakhi, but when he got around to Hindi he said that we were a touch late this year. The argali had already moved higher up. We would need to head to Kyamar to sight them.

While the prospect sounded exciting, it would involve more walking! We camped at Kyamar and when we left to survey our surrounds the following morning, it took little time for us to get our first look at a herd of Tibetan argali. The rams of this species of mountain sheep are a sight to behold, especially in their fine winter coat. We were there towards the end of their rut and noticed hectic activity in the herd, which we scanned through our binoculars. Amazingly, Tashi Phuntsog knew their movement and habits. We felt good to know that there were more like him in these valleys who cared for the majestic animals even though their own domestic herds grazed in the same pastures.

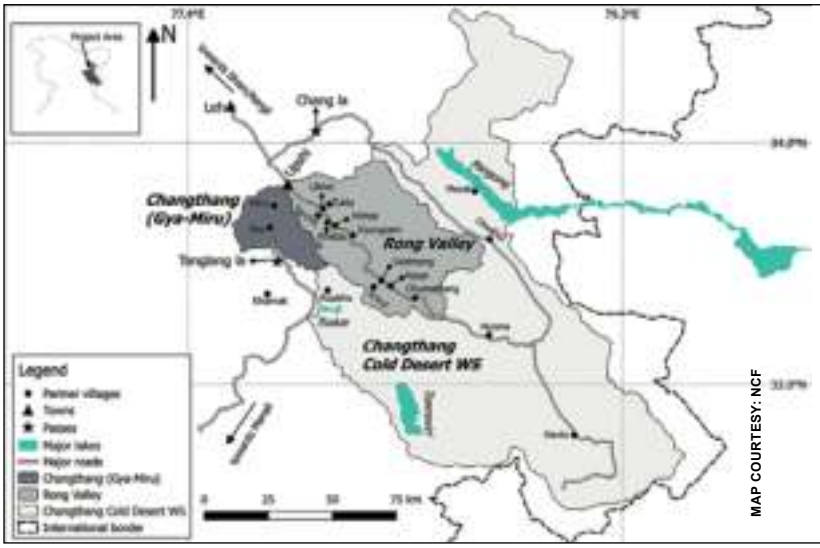
LADAKH – ONE OF A KIND Geographically, Ladakh is a trans-Himalayan cold desert located between the Karakoram range to the north-west, the Zanskar range to the south-west, with the Ladakh range running along the north bank of the Indus river, which enters at Demchok at Ladakh's south-eastern tip.

Its unique geographical location makes it the distribution limit for several species found across the wider mountain habitats of the Hindu Kush, Himalaya, in Central Asia. This includes carnivores including the snow leopard, Tibetan wolf, Eurasian lynx, brown bear and Pallas's cat, and ungulates such as bharal, Himalayan ibex, Tibetan argali, Tibetan gazelle, Tibetan antelope, Ladakh urial and kiang. Additionally, the landscape is home to over 300 species of birds, including the charismatic Black-necked Crane. Not surprisingly, the region has always interested ecologists. Our own efforts began with staff training and joint surveys carried out with the Department of Wildlife Protection.

Initial field surveys in Changthang and Nubra regions in the early 2000s were followed by species-specific surveys for Tibetan gazelle (2001-03), Ladakh urial (2003-04), kiang (2001-06) and Tibetan argali (2005-09). Much of this work was initiated and led by Yash Veer Bhatnagar first as a scientist at the Wildlife Institute of India (WII) and later with the Nature Conservation Foundation (NCF). Such surveys also provided opportunities for Ladakhi youth and young researchers to participate in systematic field studies. These surveys, along with concurrent work from other snow leopard landscapes in Himachal Pradesh and the newly formed Uttarakhand, laid the foundation for Project Snow Leopard (see more in box on page 27).

Snow leopard landscapes in India share typical characteristics. They constitute a continuum of habitats from Kashmir in the west, to Arunachal Pradesh in the east. The fact that they are

> "FIELD RESEARCH HELPED IDENTIFY THREATS AND INITIATE CONSERVATION EFFORTS. WE THEN ATTEMPTED TO BUILD A LONG-TERM ENGAGEMENT WITH PASTORAL COMMUNITIES, WHO HAVE REMAINED OUR STRONGEST ALLIES."



ABOVE *Petroglyphs, carved c. 5,000 years ago in Ladakh, depict scenes of humans, wildlife and livestock.*

TOP *A map of the trans-Himalayan cold desert that is Ladakh, highlighting the Nature Conservation Foundation's project survey areas to assess species density.*

FACING PAGE *The Himalayan ibex* Capra sibirica *prefers steep semi-desert areas across northern and central Asia, including Ladakh, J&K and Himachal Pradesh.*

Species Surveys In J&K

Kashmir valley is nestled between Zanskar range in the north and Pir Panjal in the south. North of the Zanskar range is the Gurez valley formed by the Kishenganga river and south of the Pir Panjal, the mountains taper down to the subtropical Shiwalik hills of Jammu. This diverse region harbours the hangul, musk deer, Himalayan tahr, goral, brown and black bear, snow leopard, common leopard and other species. While there was some information on the state animal, hangul, even basic information on the occurrence of the other species was mostly lacking.

There was almost no information available on the markhor either. In the mid 2000s, with the Wildlife Trust of India and the J&K Department of Wildlife Protection (JKDWP), NCF scientists initiated a survey of the potential range of the markhor (see page 70). This survey was conducted in partnership with the Indian Army and confirmed a reduction of 60 per cent in its range since India's independence and barely 300 animals surviving in the state, most of these in the Kazinag Mountains in the Uri sector, on the Line of Control with Pakistan. Other populations seem to have perished to hunting and developmental pressures; a small population that survived in the Hirpora Wildlife Sanctuary is under threat from the blacktopping of the Mughal Road (first carved out by emperor Akbar's invading army) set up to connect Rajouri to Srinagar. Aided by this study, the JKDWP designated a 160 sq. km. area as the Kazinag National Park in 2007 to strengthen markhor conservation. We soon followed this with another collaborative project on markhor ecology led by a researcher from WTI, Riyaz Ahmad. It studied the seasonal habitat use and diets of markhor and highlighted the tremendous threat being posed by the increasing livestock of the transhumant herders that visit the area during the short summer season.

In partnership with the State Forest Research Institute, we conducted pioneering surveys in little-known areas in Gurez and Jammu, and Bani-Sarthal region in Kathura District, adjoining Chamba in Himachal Pradesh. In Sarthal, we focused on confirming the occurrence of the Himalayan tahr. The Sarthal area is a stunning alpine meadow leading over the Chattar Pass into the Chenab Valley and was recommended as a site suitable for developing responsible tourism. In Gurez, we documented the presence of snow leopard, ibex and musk deer with the possibility of hangul venturing in some of the upper valleys along the southern banks.

A young researcher from Kashmir, Munib Khanyari (see page 56), is now planning more detailed work in Gurez and other areas of Kashmir that should lead to more interesting conservation initiatives in the region.

> "THIS IDEA WAS BUILT ON OUR SUCCESSFUL WORK IN NEIGHBOURING SPITI, WHERE WORK LED BY CHARUDUTT MISHRA HAD SUCCEEDED IN AUGMENTING UNGULATE POPULATIONS."

SATVIK SHAHPUR

NCF worked with the State Forest Research Institute to confirm the presence of the Himalayan tahr in little-known areas of the Gurez valley and in Jammu. They also recorded snow leopards, ibex and musk deer.

sparsely populated (two to five people per square kilometre) probably enables both people and wildlife to co-exist at low densities. These regions are traditionally inhabited by pastoral and agro-pastoral communities dependent on high-altitude pastures that also support much of the wildlife. Clearly any attempts to conserve wildlife must involve the active participation of local communities and this means looking beyond the conventional approach of Protected Area management. Such insights were built into Project Snow Leopard, which advocates a participatory approach to the conservation of rare high-altitude wildlife… even as it adopts a landscape-level strategy to manage this fragile ecosystem. Towards this end, the first national workshop for Project Snow Leopard, convened in Leh in 2006, was officially launched by the Ministry of Environment and Forests in 2009.

MAKING CONSERVATION PARTICIPATORY Field surveys carried out through the 2000s helped identify areas of high wildlife value in parts of Ladakh. Among these was Kalak Tartar near the remote settlement of Hanle in Changthang. This rolling plateau was home to a small population (c. 50) of Tibetan gazelle (the largest in Ladakh) with another smaller population reported from Sikkim. Proximity to international borders added to the risk faced by the species, as it witnessed a precipitous fall in numbers at the hands of hunters across the border.

The *Changpa* herders of the region, however, maintained an uneasy truce with the species that compete for sparse forage with their livestock. In 2007, a dialogue with the herders led to the setting up of a socially-fenced reserve – a small area to be kept free from livestock grazing in exchange of monetary support – in the hope that this might provide forage and refuge to the gazelle when it was most needed in the harsh winter months. What is

Project Snow Leopard and Union Territory-Wide Snow Leopard Monitoring

The MoEFCC initiated Project Snow Leopard (PSL) in 2009 to enable scientific, participatory and landscape-level conservation of the high-altitude areas of the Himalaya, a programme catalysed by NCF and other partners. However, with little credible information on snow leopards in Jammu and Kashmir, the programme primarily remained focused in Ladakh. With the designation of the new union territory, J&K Department of Wildlife Protection (JKDWP) is now keen to benefit from this national programme for the conservation of the high-altitude areas that cover over 12,000 sq. km. NCF will support the Wildlife Department to identify the best candidate for their PSL landscape and, with other local institutions, also assist in preparing its management plan with the PSL management planning guidelines.

Understanding the population status of any species, especially a flagship such as the snow leopard, is crucial to plan and monitor conservation programmes in any area. The inhospitable habitat of this elusive cat made it even more difficult to estimate its numbers. Till about a decade ago, a reliable estimate of its population was not available for even Protected Areas, but advances in camera trapping, molecular methods and statistical analyses, have changed this. Using the best knowledge developed in studies across many countries, the Global Snow Leopard Ecosystem Programme, a joint initiative of the 12 range countries and conservation partners, put together a protocol – the Populations Assessment of World's Snow Leopards (PAWS) in 2019. NCF facilitated the adaptation of this protocol by the MoEFCC, in partnership with other scientific organisations and the state forest departments in what was called the 'Snow Leopard Population Assessment in India' or SPAI. This protocol has a two-step sampling approach to cover a bulk of the snow leopard's range in each of the six states and union territories in the country. The first step is estimating the occupancy of snow leopard and prey species across the state, stratifying the region as per habitat quality, and then estimating abundance of species in a reasonable area within each strata using camera trapping based analyses. This is a massive exercise, and the Himachal Pradesh Forest Department has recently completed it for their state in collaboration with NCF. We are now assisting JKDWP to design and implement SPAI. Since many areas within J&K have restrictions, we plan to have concerted fieldwork by well-trained forest staff and volunteers so that the occupancy and abundance surveys can be completed in one go. For abundance, together with national and state-level institutions, we plan to rely on genetic tools that can be more effective in this situation.

more, the herders agreed to keep watch on the endangered gazelle and report their presence at regular intervals. This idea was built on our successful work in neighbouring Spiti, where work led by Charudutt Mishra had succeeded in augmenting ungulate populations. Soon after, a similar arrangement was worked out in the Gya-Miru region, which was home to a population of Tibetan argali. Here it was herders such as Tashi Phuntsog that served as the argali's guardians.

For the herders themselves, such efforts were not a significant departure from their traditions. Petroglyphs found across Ladakh that date back c. 5,000 years generously depict scenes involving herders, livestock and wild animals. Local folklore is rich with references of wildlife, even describing them as having human-like attributes of intelligence, fairness and guile. However, the possibility of negative interactions with wildlife always persists. Livestock depredation by carnivores is a reality that herding communities live with across the snow leopard range. Incidents of 'surplus killing' of livestock by carnivores though rare do take place. Such incidents can wipe out a large part of a herder's stock in a single event. When such unfortunate incidents occur, the risk of retaliatory killing, or at least, highly negative attitudes, are inevitable.

Ungulates, on the other hand, are often seen as direct competition for livestock forage, as exemplified by herder perceptions of the kiang. Interestingly, our studies revealed that the conflict was primarily for the scarce moist sedge meadows near lakes and valley bottoms where kiang congregated in autumn for their annual rut, when the forage they consume is badly needed by herders as winter-reserve pasture.

> "AN ENVIRONMENTAL EDUCATION PROGRAMME STARTED IN 2010 AIMED AT REINFORCING THE CONNECTION OF CHILDREN WITH NATURE AND THE OUTDOORS."

Initial surveys in Changthang and Nubra in the 2000s, much of them led by scientist Yash Veer Bhatnagar, helped lay the foundation for Project Snow Leopard, launched in 2009.

> "SNOW LEOPARD LANDSCAPES OF INDIA SHARE TYPICAL CHARACTERISTICS. THEY CONSTITUTE A CONTINUUM OF HABITATS FROM KASHMIR IN THE WEST, TO ARUNACHAL PRADESH IN THE EAST."

RIGZEN DORJAY

SURYA RAMACHANDRAN

ABOVE *A Pallas' cat* Otocolobus manul *scales a rocky cliff in the remote settlement of Hanle, where proximity to international borders and associated conflicts, together with rampant poaching threaten wildlife populations.*

TOP *A traditional* shangdong, *built to trap wolves. Local communities whose livelihoods are affected by livestock depredation often set up traps to capture wild predators.*

The herder's life is challenging from braving harsh weather to protecting their herds against unforeseen risks. Expecting them to also support conservation is unreasonable, unless these measures also secure their livelihoods. Most of our wildlife conservation efforts over the past decade has been concentrated on creating conditions that enhance their incomes, thus allowing traditional pastoral communities to participate and benefit from conservation.

In Eastern Ladakh, home to pastoral communities including the famous *Changpa*, our initial attempts sought to minimise the risk of conflict and to set up mechanisms for financial relief if and when conflicts took place. This led to the first community-based livestock security programme in 2005, whereby herders contributed a mutually agreed amount to insure their livestock. The planning and running of the programme were undertaken by the herders themselves, who received matching contributions to their collections to make the programme partially sustainable. Such programmes allowed herders to avail financial relief when livestock losses occurred and since the programme was fully administered by locals – and involved a financial cost for participation – there was a lower risk of false claims and attempts to 'game the system'. Other efforts that started in 2011 involved predator-proofing night time corrals to prevent carnivores from entering them, thus preventing incidents of surplus killing. Under such arrangements, herders with vulnerable corrals received support to refurbish them. Soon more herding communities agreed to set up grazing-free reserves within their pastures and this helped revive pastures and ungulate populations. Our role was restricted to seeding the idea and offering technical and financial support when conservation interventions were required. The process was entirely managed by the community, which helped because each community faces unique challenges and the interventions became locally relevant and fair to all.

All this was made possible on the ground, thanks to a small but strong local team we were able to build over the years. Led by individuals like Karma Sonam, our frontline team became the first point of contact for herders with whom we initiated all of our efforts. *Pari passu*, the team led field surveys with various researchers who have supported our work down the years.

ADAPTING TO CHANGE Over the past decade, Ladakh has witnessed enormous change. Tourism has grown exponentially, and communities in even the remotest corners seek to benefit from the influx. This led us to partner with local Ladakhi organisations like the Snow Leopard Conservancy - India Trust, to expand their popular Himalayan homestays into Eastern Ladakh. Local homestay owners were provided support and training to sensitively host travellers. This period also saw a rise in urban migration to Leh, especially among the younger Ladakhis in search of better education and livelihood prospects.

An environmental education programme started in 2010 targeting local school students of Leh and government schools of Eastern Ladakh helped us introduce education activities to reinforce the connection of children with nature and the outdoors. The nature education camp saw children camping outdoors, which almost always left them with a greater and lasting appreciation for their own local flora and fauna. The emphasis was on inculcating appreciation and values using all their senses… not entirely on knowledge.

Throughout the years, we have worked with local communities to set up interventions that address a range of conservation threats. Such partnerships provided opportunities for local ingenuity to surface. For example, the prevalence of traditional wolf traps, or *shangdong*, across Ladakh was a key conservation challenge. These structures were once used by herders to trap and kill wolves to protect against livestock losses. Such traps are rarely used now, because local communities have become the beneficiaries of biodiversity, including wolves and other species. Consultations with local herders led to the idea of building a *stupa* (an auspicious Buddhist structure) alongside the *shangdong* to reaffirm their commitment to respectfully coexist with wildlife and cause no further harm. This led to the Shangdong to Stupa initiative in 2018 that saw herders from Chushul neutralising their traditional wolf traps without destroying the structure. The *stupa* thus built was consecrated by local religious heads who backed this idea and encouraged more communities to adopt such proactive conservation measures.

As a wildlife research and conservation organisation, field research laid the basis for identifying threats and initiating conservation efforts. What followed was an attempt to build a long-term engagement with pastoral communities, who have remained our strongest allies. Despite the challenges faced by them, these communities persist in sharing space with rare, high-altitude wildlife. More recently, our efforts have been to try and synergise alliances for conservation that can have a scalable impact. Working with the Ladakh Autonomous Hill Development Council we are working to boost Ladakh's pashmina wool sector to provide livelihood benefits for *Changpa* herders and Tibetan Refugees (TRs) engaged in herding across the Changthang region of Ladakh.

A look back at the past two decades reiterates the fact that conservation threats evolve over time. Even a region as remote as Eastern Ladakh has seen dramatic change in this period. Even as you read, several parts of Eastern Ladakh are facing a new challenge from the increasing tensions at the Indo-Chinese border. While these have severe geo-political impacts, they also affect the daily lives of the herders, their livestock and the wildlife that co-inhabit this space. One clear impact is the loss of precious pastures due to such disputes. The safest bet to preserve these unique ecosystems is to back local communities by empowering them to address their own conservation concerns.

Acknowledgements: *Our work has hugely benefitted from the continuous support and guidance of various officers in the Department of Wildlife Protection. We also acknowledge the support of officers in the Sheep Husbandry Department and elected representatives of the Ladakh Autonomous Hill Development Council. Our work was also made possible by the generous support of the NatWest India Foundation (previously RBS Foundation India), and the Snow Leopard Trust.*

Ajay Bijoor works with local communities and government agencies to plan and implement conservation action in parts of Ladakh and Himachal Pradesh. He also supports research activities. He is Assistant Programme Head of the High Altitude Programme in NCF and hails from Mumbai.

> "THE HERDER'S LIFE IS CHALLENGING, FROM BRAVING HARSH WEATHER TO PROTECTING THEIR HERDS AGAINST UNFORESEEN RISKS. EXPECTING THEM TO ALSO SUPPORT CONSERVATION IS UNREASONABLE."

ABOVE *NCF focusses on building alliances for conservation, and partners with the Ladakh Autonomous Hill Development Council to boost the pashmina wool sector, to benefit herding communities.*

TOP *In 2010, NCF began conducting interactive outdoor nature education camps for young students in Leh and Eastern Ladakh, focused on creating knowledge and an appreciation for flora and fauna.*

COURTESY: FAROOQ GILLANI

The *Sanctuary* Interview

Meet Farooq Gillani

Born and raised in Srinagar, Syed Farooq Ahmad Gillani spent his youth trekking the Himalayan mountains and skiing the slopes of his home state and never dreamed that he would one day be key to the protection of the forests, rivers, wetlands and wildlife of his precious Kashmir. An outdoors man whose father is an educationist, he spent his life defending the wild, as part of the J&K Forest Service. He met ***Bittu Sahgal*** *in Mumbai where he came to present a Sanctuary Wildlife Service Award to Arun Gour, a young 29-year-old beekeeper committed to protecting the Himalayan ranges and people of Tehri Garhwal.*

You speak with passion about how the agenda for J&K must incorporate the ecological restoration of a land that generations of Kashmiri children have believed was their heaven on earth. Yes, I see that as the only way in which my people have any hope of living the kind of carefree, safe, and wonderful life my parents gifted to me when I was a child. The Himalaya truly represents heaven on earth, and I believe generations to come will find purpose and joy in the same mountains I have trekked and worshipped all my life.

You are a diehard mountain man. Was this love imbibed from your parents? Every Kashmiri is a diehard mountain man or woman. The mountains are the breath we breathe. My father retired as a lecturer in the Education Department and I was schooled in Srinagar. My mother taught me love for nature and the ways of mountain life.

Did you choose the Forest Service, or did that just happen? As you know, my purpose in life was to enjoy the mountains. That I ended up protecting the slopes that gave my life purpose has been my greatest blessing. Forests, rivers, wetlands, wildlife and snow are the very soul of Kashmir. I bless my father for nudging me in 1984 to sit for the competitive exams for the Public Service Commission, immediately after I

TOP RIGHT *Farooq Gillani with Irfan Rasool, Coordinator, Water Management and the Wular Conservation and Management Authority (WUCMA) team in 2020 to monitor the Wular lake conservation work.*

BOTTOM RIGHT *Gillani with Irfan Ali Shah, Conservator of Forests, Srinagar in 2010 at the Hokersar Wetland Reserve.*

FACING PAGE *Gillani has had an illustrious 38-year career with the Forest Service, retiring as the Additional Principal Chief Conservator of Forests of J&K. Here he is seen, in 2006, with Intesar Suhail and other officers at the Dachigam National Park when he was the Regional Wildlife Warden.*


COURTESY: FAROOQ GILLANI


COURTESY: FAROOQ GILLANI

had completed my degree in law from Kashmir University. I had two choices, the Kashmir Administrative Service and the Forest Service. I qualified for both, but my heart was in the forest and that was the best decision of my life. I don't even know where the past 38 years have flown, serving at several locations and culminating with my post as Additional Principal Chief Conservator of Forests of J&K.

But all our forests are under threat today… They are. Between climate change and the fact that human nature tends to make us all take clean air, pure water and fertile land for granted, we lost sight of how our living world was slipping away from us, degrading so slowly that we kept adapting to and accepting the 'new normal' when we should in fact have been fighting to prevent the steady degradation of our 'heaven on earth'.

Among the last of your responsibilities before retirement was the protection of the Wular lake as the Chief Executive Director of the Wular Conservation and Management Authority… That is right. Wular is the lifeline, the lifeblood, of the people of Kashmir. It is now a shadow of what it was but restoring it will not only help to restore Kashmir, but also provide employment and better health to lakhs of people. I believe these communities must be the primary beneficiaries of the biodiversity renewal that will be the centerpiece of J&K's development plans going forward.

There is more I would like to speak about Wular Lake, but for a moment let's shift focus. You worked closely with one of J&K's legendary conservationists Mir Inayat Ullah, right? He was my mentor and I like to believe I was one of his favourites. He was determined to stem the destruction of our forests and with him I travelled across our state to regions like Baramullah and Bandipore, which had virtually been turned barren. He instructed me to work with local communities and while much was achieved, I believe now is when we need more people like Inayat *saheb* to emerge once more to weld the issues of biodiversity, climate change and human health. I see no reason why trees for fuelwood and construction should not be grown on farmlands, leaving our forests to regenerate naturally through nature-based solutions. This will create lakhs of jobs and will start the slow journey back to climate security.

But does 'the system' understand such connections and the adverse impact of monoculture plantations? We can see the impact of climate change everywhere. But as far as the wildlife of J&K is concerned, while there has been some research, a lot more needs to be done to understand the short and long-term implications of climate change. The system is changing. Young persons in Kashmir are much more aware today of the consequences of biodiversity loss than we were as children, because we never dreamed that nature could take such a beating from humans. We know now that wild species will repair and recreate wildernesses more effectively than humans can and at a lower cost, with greater social justice and resource distribution through programmes such as the One Beat Guard, One Village programme. This seeks to green lands outside our natural forests by involving Village Panchayats, Biodiversity Management Committees (BMCs) and Joint Forest Management Committees (JFMCs) with whose help simple strategies, such as creating 'seed balls' of local plant and tree species, can help kickstart our green renewal.

You've also worked in the cold deserts of Ladakh. Yes, I have served in all three regions of the earlier state of J&K – Ladakh, Jammu, and Kashmir. I was the DFO and


COURTESY: FAROOQ GILLANI


COURTESY: FAROOQ GILLANI

Following the ban on the fur trade in J&K, the Wildlife Department seized and burned huge stocks of wildlife skins and pelts in Srinagar in December 2007 to send a strong message that the illegal wildlife trade will not be tolerated. They even opposed those who wanted the skins used as exhibits in museums.

Wildlife Warden at Kargil. It was a life-changing experience. The cold desert needs totally different prescriptions. I worry about the impact of climate change there because glacial melt and rising temperatures will affect local biodiversity even more severely. The snow leopard, brown bear, the mountain goats, marmots and local alpine vegetation that are a part of the life support system of carnivores, are indicators of the health of our mountains.

What a long and illustrious career you have had. Was yours an easy ride? Life is never an easy ride, Bittu, as you know. I have worked in virtually every department including Social Forestry, Wildlife, Territorial, Soil Conservation, and even as the Director of the Pollution Control Board. It can be heartbreaking when you cannot implement things you know will be best, but we live on the successful battles we manage to win. When I was Regional Wildlife Warden in 2006, we asked for and got a complete ban on the fur trade and worked to compensate furriers who could not understand why we were 'ruining their livelihoods'. Nevertheless, we burnt huge stocks of skins and not just those found in J&K, but from across India, including that of tigers. J&K, like many mountain states, had become a route for the illegal wildlife trade. I even opposed those who wanted the skins used as exhibits in museums. We wanted to send out a message to the noxious trade that the party was over and wildlife was now totally off limits.

What about the *shahtoosh* ban? That was a tough one. We had to save the chiru or Tibetan antelope *Pantholops hodgsonii* (*Sanctuary* Vol. 41, No. 2, February 2021). We issued possession certificates for all shawls and bulk stocks held prior to the ban on the *shahtoosh* trade, geotagged all the shawls owned by civilians, even from the highest echelons. The process took longer, and we worked on alternative materials like pashmina wool, so the art and craft of weaving was not lost. We also offered jobs to youngsters who wanted a different life.

Talking about tough, what about the human-wildlife conflict issues? Sometimes I stay awake at night wondering how such problems will ever be solved. I am haunted by the incident where a Himalayan black bear was burned alive in Traal (see page 92). The animal died, but that served to strengthen our resolve. The onus of reducing conflict lies on us, not on bears, or leopards, or even monkeys and birds that raid farms and orchards. It's a common problem across India and I guess we will solve this problem by working on diminishing the root cause of such incidents, which is the slow human march into wild habitats. Tourism is one very practical way to reduce conflict by turning wildlife encounters considered inimical into potential sources of livelihoods.

Which brings us to Dara and the Sanctuary COCOON Conservancy project being worked on by the *Gujjar* and *Bakarwal* communities that you and NGOs like the Wildlife Conservation Fund (WCF) and some of Kashmir's finest government officials are helping us to implement. This is a vital initiative. We must recognise the rights of locals to livelihoods and guarantee them pride of place in all our developmental plans. People in the union territories of J&K and Ladakh are not demanding right to land, but rather to access the productivity of lands that have been theirs for generations. Dara's communities well know the importance of Dachigam, next to which they live. By making them the custodians of biodiversity and ensuring that they are the first beneficiaries of the wilderness through controlled and well-managed community tourism, not just livelihoods will flourish, but also the biodiversity that appears to be in retreat in J&K and across India.

How do you feel this can be done? Well, ecotourism models that have delivered both justice to communities and helped restore biodiversity must be emulated. We have managed to do so in Ladakh and hope to amplify the idea, through ideas such as your Community-Owned Community Operated Nature (COCOON) Conservancies in Dara and also possibly the Overa-Aru and Gulmarg Wildlife Sanctuaries. Ditto around many of our

wetlands such as the Ramsar Sites of Hokersar (see page 108) and Wular, where local communities could cater to and guide the large numbers of birders in India and overseas through the havens that are ours. There are magical areas in Central Kashmir and North Kashmir that have not been explored at all, such as the Lolab and Bangus valleys and Keran, and Karna, which are so utterly beautiful that over-crowded destinations like Gulmarg will see a drop in numbers. The areas I mention above are, however, pristine and only very controlled visitation by prior booking for birders, trekkers, or just those who wish to experience nature should be allowed.

But will the big boys move in with construction and five-star tourism and what have you? That would kill the destination and steal livelihoods from locals, who do not need jobs only as waiters and watchmen. Ecotourism in its true sense must be understood. Luxury facilities already exist away from Protected Areas. Take Sanctuary's proposed Dara COCOON Conservancy for example. I have seen your plans and these involve tents and treks guided by *Gujjars, Bakarwals* and local experts. I believe this is the future of tourism across the world and not just in Kashmir. Young people could become community tourism professionals who offer rich, ethical experiences and memories.

***Insha Allah* your dreams and those of young Kashmiris will come true.** *Insha Allah*, this *will* become a reality. All my interactions with people, in Pahalgam, Wular, Hokersar suggest that all they want is to be able to live in dignity, with their children free from issues such as pandemics and violence. They are not averse to such ideas, which are all ingrained in the traditions passed down to them by their ancestors. They are not enemies of environment and conservation. But we cannot offer long-term dreams without short-term solutions. They must have sustainable livelihoods TODAY, if we wish to win their support for biodiversity and climate action tomorrow.

What are your thoughts about the kinds of livelihoods that can achieve the twin objectives of self-sufficiency of local communities and biodiversity regeneration? This is not difficult, if the policies are well thought out. Lakhs of jobs can be created to regenerate the Wular and Hokersar lakes and even the more popular waterbodies such as Dal and Nageen. Several jobs would involve soil and moisture conservation works that are labour intensive, but a very large number would create opportunities for tourism, which the very hospitable Kashmiris understand from their marrow. Virtually every Kashmiri will have an opportunity to participate in welcoming guests and caring for their every need from transport and residential stays to taking back mementos and memories. Indirectly, the collateral benefits of restoring wetlands such as Wular lake would help control floods and droughts, sequester and store carbon and directly moderate the worst impacts of the climate crisis we are all grappling with. But, ultimately, before all other claimants, it must be the local people who are consulted and who benefit.

If you had a magic wand, what three things would you wish for to bring Kashmir back to its days of glory? This is difficult to answer. However, I am glad that the government of the union territories of Jammu, Kashmir and Ladakh are prioritising the environment.

So, my key first wish is for this to continue. The government has already issued a series of orders that will be beneficial to biodiversity protection.

ABOVE *The Gillani Family (Farooq Gillani with wife Nagina Parveen and sons Shahrukh and Kafeel) at their Srinagar residence in 2020.*

My second wish is what we have discussed in this interview. I want local people to be consulted and to be involved closely with all conservation initiatives. No more token Forestry Day tree planting ceremonies… only very real involvement by schools, education departments, the judiciary, paramilitary, NGOs and more. We need indigenous species to regreen areas outside forests. The army too could play a major peacetime role.

My third wish, and I am glad that we are working toward it, is that the Sanctuary Nature Foundation and other organisations such as the Bombay Natural History Society should revive and strengthen the same ties with Jammu and Kashmir that Sanctuary helped create in the 1980s, when I was a young man. I still remember the wonderful snow leopard on the *Sanctuary* cover, which still has pride of place on my book shelf. At the time, with Inayat *saheb*, Sanctuary helped with the International Snow Leopard Foundation meeting that was hosted by J&K, which saw several conservationists and government officials from so many states across India participating.

You ask for three, I listed three, but I have many more!

OK... one more! Getting young people involved not just in urban centres but also those living close to biodiversity is key for Sanctuary. You are honouring us by agreeing to advise us. I want the young people of Kashmir, our future… people like the lawyer Nadeem Qadri and so many others who are doing such tremendous work to be encouraged and supported. The ambitions of our generation must give way to the imperatives and dreams of the young seeking peace, goodwill and a good life.

Personally, I commit that I will work with Sanctuary and young Kashmir to overcome the negative news cycle of the past two decades and return Kashmir to the status as global players in the protection of the biosphere, as we were 40 years ago.

COURTESY: RICHA PRASANT

In Memory of

P.K. SEN *SAHEB*

(August 4, 1941 – May 2, 2021)

By S.E.H. Kazmi

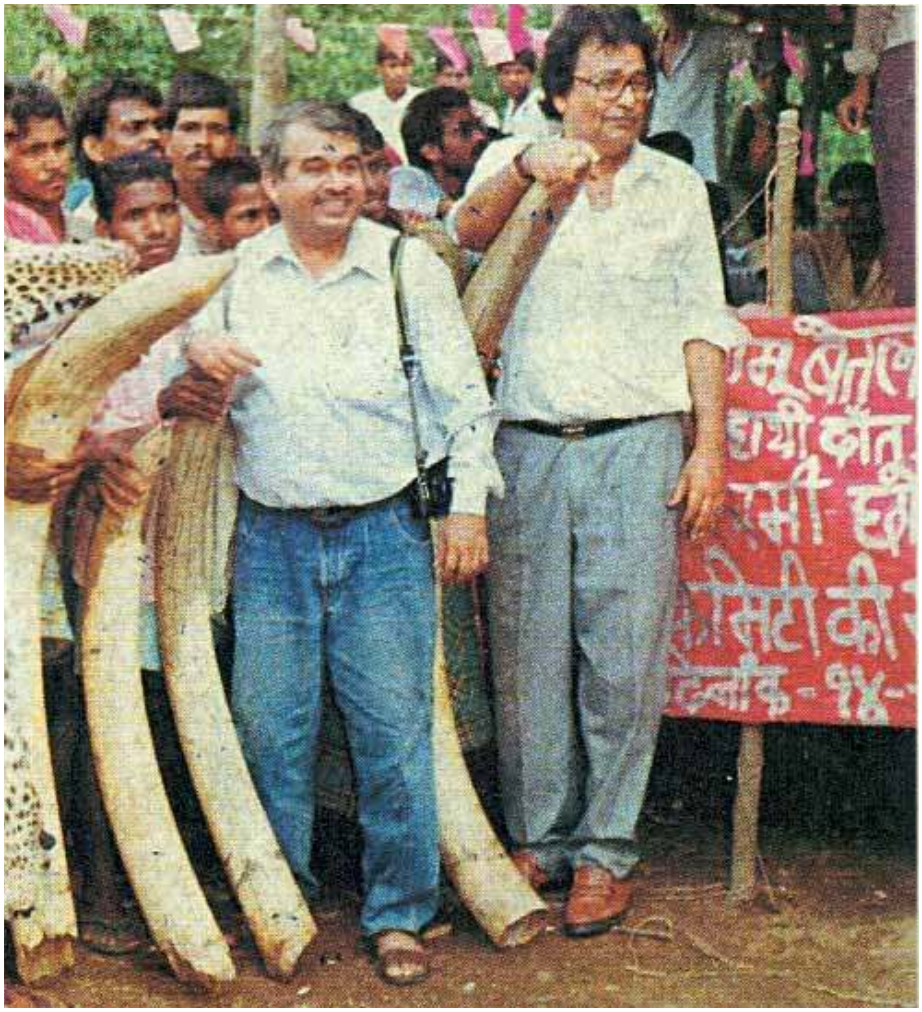
This perhaps is the most difficult assignment of my life. Writing the obituary of Prashant Kumar Sen or Sen *saheb* – my mentor, my hero. His journey onwards to happier hunting grounds has shattered so many of us. I am still coming to terms with his departure. I wonder, do men like Sen *saheb* truly die? Perhaps not. Perhaps they live on through their work, and in the hearts of all those lucky enough to have known them.

I first got to know Sen *saheb* way back in 1987 when I was a young probationer, fresh out of the Forest Research Institute (FRI), Dehradun and staying at the Bhalua Forest Rest House in then undivided Bihar's Gautam Buddha Wildlife Sanctuary. One bright morning, the Assistant Conservator of Forests (ACF) of the Gaya Forest Division – the controlling division of the sanctuary – came to the forest bungalow and told me that a senior forest officer would be halting for lunch at the rest house on his way back to Ranchi from Patna. I was intrigued. It was very rare for any officer to visit this secluded bungalow in those days due to the raging Maoist insurgency in the area. Out of curiosity, I asked the ACF about this guest. He reverentially informed me that the gentleman was a towering personality within our department, very fond of wildlife, extremely protective of his juniors and subordinate staff. "*Bas daant te bohot hain* (He scolds a lot though), but his anger is superficial," he chuckled and added that he never harms anybody using his 'pen'. Immediately I knew that there was something very different about this officer. Eventually, our guest arrived – a tall, well-built man immaculately dressed in crisp white trousers and a shirt. He got down from the vehicle at the gate of the bungalow campus, received our salutes and greetings and walked. Oh! What a walk – quiet, leisurely and yet commanding respect. It reminded me of the walk of a tiger in his jungle. I have no qualms in admitting that I was absolutely overawed by his presence. After my initial introduction, he asked me if I stayed in this bungalow. "Yes," I said. "*Darr nahin lagta akele*?" (Aren't you scared all by yourself here?). I said no, and that in fact

I really liked it here given the abundant wildlife around the bungalow and the quiet. He looked at me and just smiled.

I had a few more interactions with Sen *saheb* in the next few years, but I really got to know the officer and the man himself from 1992 when he became the Field Director of the Palamau Tiger Reserve (PTR). I had taken over the charge of Daltonganj (South) Division (now renamed as the tiger reserve's Buffer Division) just a year earlier, and my batchmate A.K. Pandey was the Deputy Director, Project Tiger Division (now renamed as the tiger reserve's Core Division). In fact, there is a funny little incident related to his becoming my boss. In late 1991, the transfer of the Field Director at PTR – the very accomplished R.C. Sahay *saheb* – was due. I met Sen *saheb* in Ranchi – he was the Conservator Headquarters there at the time. I casually mentioned another officer's name and said that if the said officer were posted as FD of Palamau it would be good. He frowned and in his typical mock-scolding *andaaz* asked me, "Do you think that is the best boss you can get?" I was puzzled but he didn't elaborate. About a month later, he joined as Field Director, PTR.

Sen *saheb* was the finest conservationist I ever knew, and used to often buy trouble with the highest and mightiest. Let me narrate the story of Mandal Dam, now much in the news. When the irrigation department wanted to close the dam's sluice gates, we initiated field operations to stop the illegality. However, it was Sen *saheb* who not only gave his DFOs administrative cover but also defended our case at every possible forum. In fact, when the pressure became too much, he advised me to go on leave but not succumb to the pressure. He had perfected the art of 'working the system' for conservation goals, and would often shoot explanatory letters to us as was instructed by the senior bureaucratic apparatus. However, as soon as the letters had been dispatched to my officers, he would call me to his chamber and tell me, "Whatever letters I have sent you, you just ignore them and stick to the law." He would even go on to defend our case in front of the Chief Minister himself and that is how we eventually managed to obtain a moratorium against the closing of sluice gates until all the clearances were granted by the Government of India.



COURTESY: RAZA KAZMI

Sen *saheb* gave his DFOs free reign to go after poachers, and consequently we busted a number of poaching rackets under his tenure. If it was not for Sen *saheb's* unstinting support and leadership, a large part of Kutku range forests would have been sacrificed to mining, while another large portion of Palamau would perhaps have become an Army Firing Range – a proposal mooted in the 1990s thanks to him giving his DFOs free reign to stop it and take care of all the necessary administrative manoeuvrings.

I shall narrate one more remarkable instance demonstrative of his fearless and

ABOVE *The author S.E.H. Kazmi and P.K. Sen with massive elephant tusks and a leopard skin that they retrieved from the Maoist Communist Centre (MCC) in 1995 at great risk to their lives.*

FACING PAGE *Born in 1941 in Kolkata, P.K. Sen moved to Bihar in his youth. After a lifetime of protecting the forests of Bihar, he was appointed as Director of Project Tiger until he retired. He was honoured with the Padma Shri by President Pratibha Patil in 2011. A Sanctuary Lifetime Service Award was presented to him in 2002.*

Sen saheb *would go out of the way to help the frontline staff... he would personally check on their welfare, if anyone was sick. He would not only enquire of their wellbeing but always give them some money for treatment.*

ADITYA CHANDRA PANDA

ABOVE *The author and P.K. Sen contributed tremendously to the conservation of the Palamau Tiger Reserve, one of the first nine to be declared in India. In a 2002 interview with* Sanctuary, *he said: "I was posted at Palamau in 1967. Anyone who has been there will understand why I fell in love with the tiger. These forests, made famous by Dunbar Brander, Sanderson and Captain Forsyth, did not merely seed my passion, they injected in me a desire to protect nature."*

protective nature – almost paternal in a sense – that I had first heard of all those years ago at Bhalua from the ACF. On the night of July 27-28, 1995, four tusks and one leopard skin were stolen from the Nature Interpretation Centre at Betla in PTR. Betla, the base range of the Project Tiger Division, was under Sen *saheb's* direct control, though by that time he had been promoted to hold the additional charge of CCF in Ranchi and thus had to shuffle between Palamau and Ranchi. When he came to know about the robbery, he came to Betla and after the initial round of severe tongue lashing, he sat down on the stairs of the tourist canteen, called me and said, "Kazmi, *dekho budhauti mein ye sab saala humre munh par kaalikh mal diya hai, isko theek karna hai*," (Kazmi, I have been embarrassed in my last years as an officer, we have to rectify this) and formed a crack team led by me (despite Betla not being under my jurisdiction) to recover the material. We later found out that the aforementioned stolen government property had been confiscated from the robbers by the outlawed Maoist Communist Centre (MCC) who were running a parallel insurgent government across the hinterlands of Chotanagpur plateau. In my initial meeting with them for negotiations, they wanted a senior officer and me to meet them on a certain date at a certain place to get the contraband back. When I informed Sen *saheb* of this demand, he did not even flinch and immediately agreed. And so the two of us went to a huge Jan Adalat called by the Maoist rebels where they handed over the four stolen tusks (137 kg.) and leopard skin. Sen *saheb* was worried that the police would come after me once this news became public. He instructed me to tell the police that I knew nothing about this entire affair and ask them to talk to the Field Director – as he was the one who had informed the government and police about this recovery – and he would handle it from there. He ensured that no harm came to us from the police.

Then there was also the lighter side of his personality that brings a smile to my face even to this day. Once, me and A.K. Pandey were chatting when we were summoned by Sen *saheb*. After the routine instruction he asked us what were we doing. Before Ashok Pandey could speak, I blurted out "sir, *aapki buraai kar rahe the*" (sir we were backbiting about you). He just gave us a look and did not respond but later, whenever he would meet us in the presence of other officers, he would always introduce us saying "these are my DFOs, they have no work except abusing me. And see the temerity of this joker [pointing at me] that he even tells me that they were backbiting." My standard response would be "Sir, *ab do gunaah ek saath thodi na kar sakte the, ek toh aapki burai aur dusra aapse jhoot bolna*" (Sir, now we could not commit two sins on that day, could we – backbiting and lying to you about it). Everyone would have a good laugh. Sen *saheb* was such a great person that he never took anything to his heart. I also got to know during my time with him that his one weakness was a nice *paan*. So, whenever he summoned me and I knew I was about to get in trouble, I would ask my peon to place this special *paan* I knew Sen *saheb* liked on *saheb's* table. I would then wait for a while, knowing he wouldn't be able to resist eating the *paan*, and then go into his office. As expected, he would be enjoying the *paan* and after a few muffled words would dismiss me and by the time he was done with his *paan* his anger would dissipate. He eventually realised this trick however. So the next time the peon would come calling for me, I'd ask him, "has *saheb* begun having his paan?" to which he would reply, "*hum diye toh table mein side mein rakh diye sahab jab bataaye ki aap bheje hain ye paan aur bole pehle Kazmi ko bolo report karne ko idhar uske baad paan khaenge!*" [When I gave your *paan* to him he kept it on the side of his table as soon as I told him that you had sent it, and told me that I should ask you to report to his chamber right away and only then he would start having that *paan*!].

I have purposefully focussed on my memories with Sen *saheb* as I got to know him, for there are people who know of his many battles for conservation in Bihar before I joined the state in 1987, and of his herculean work during his tenure in Delhi as Director, Project Tiger, after he left Palamau.

As I remember my time with the great man, so many memories come flooding. How Sen *saheb* would go out of the way to help the frontline staff, how he would personally check on their welfare, how if anyone was sick, he would not only personally enquire of their wellbeing but always give them some money for treatment, and so much more. His ever-abiding love for good food was infectious and he was famed as a very generous host. He was such a larger-than-life figure for me, I could fill pages after pages writing about him. I have learnt so much from him, and the officer that I became was in no small measure due to his support, guidance and teachings during the formative first decade of my career. And so, while Sen *saheb* might not physically be around me anymore, he will continue to live on in my heart and his legacy will live on through the work of countless people he inspired and guided during his lifetime.

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POORAN DRIVER

AMBIKA PRASAD KHARE

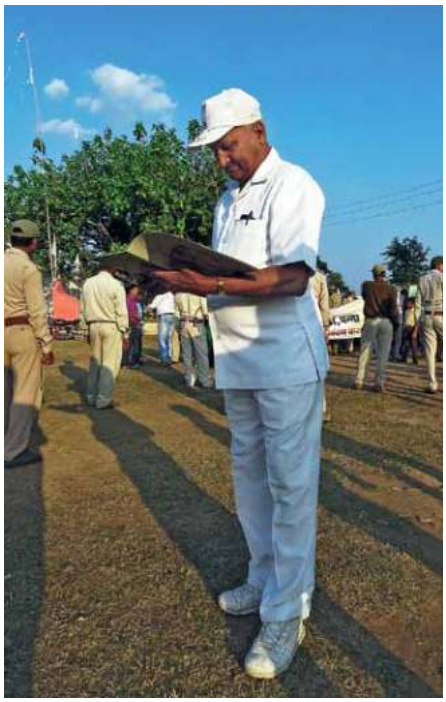
(1932-2021)

By Sreenivasa Murthy Rangaiah, Retd. IFS, Madhya Pradesh

My association with the late Ambika Prasad Khare began in 2010 when I was the Field Director of the Panna Tiger Reserve (PTR). I joined PTR in May 2009, when the tiger reserve had been declared 'empty' of tigers. My job was to assess the issues that plagued the reserve. There were many of course, but an important concern was that the Protected Area (PA) did not have the support of the local community. This was a sad statement, but not surprising given that few locals had even had a chance to visit and appreciate the tiger reserve. I realised that without the support of the community, the future of Panna would always be questionable.

To bridge this gap, I conceived the idea of organising nature camps for locals. I requested Sanjay Thakur, a Pune-based naturalist, to help me tailor such a programme for Panna. I also roped in WWF-India as a partner to strengthen the credibility of the programme and was well supported by Ravi Singh, Secretary General, WWF-India.

I first met Ambika Khare when he was selected along with his student Devidutta Chaturvedi after a stringent



PEEYUSH SEKHSARIA

SANCTUARY PHOTOLIBRARY

ABOVE LEFT *The late Ambika Khare was one of the driving forces of the Panna Nature Camps initiative, which ran uninterrupted from 2010 onwards, until the pandemic brought them to a temporary halt.*

ABOVE RIGHT *Ambika Khare and Devidutta Chaturvedi, a teacher-student duo, were awarded the Sanctuary Green Teacher Award in 2016. Together, these committed educators nurtured generations of young naturalists in Panna.*

FACING PAGE *Ambika Khare (right) leading children on a nature walk at the first Panna Nature Camp held on November 1, 2010.*

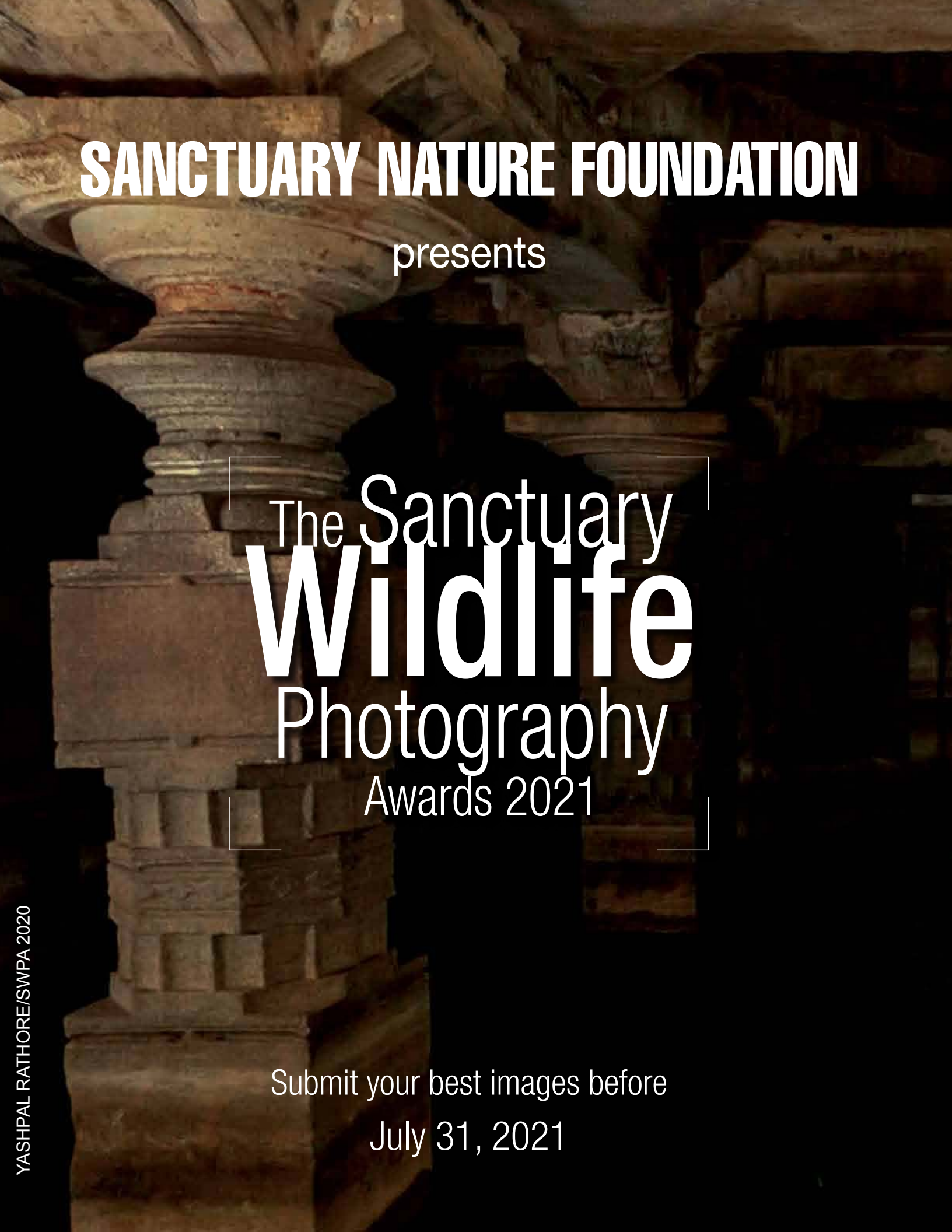
screening process to run the Panna Nature Camps. I worked with Ambika Sir and Devidutta during all the camps organised in 2010-2011 and continued to meet them frequently. From the second year, all sessions were fully booked as soon as the camp dates were announced! Ambika Sir soon became one of the most important pillars of the Panna Nature Camps, which ran successfully for almost a decade before the COVID-19 pandemic brought them to a halt in 2020 (we did manage to organise three virtual camps). To date, 236 camps have been conducted, with 7,220 participants. The duo's success in running the programme found recognition when they were bestowed the Sanctuary Green Teacher Award in 2016.

Ambika Sir was energetic and enthusiastic, despite being in his 80s. I often introduced him as the youngest member of the camp. Donning his signature white safari suit, white cap and shoes, he was a fixture at any event conducted by the Panna Tiger Reserve. In 2010, during Wildlife Week, we had organised a rally to win public support for the park. Ambika Sir quickly mobilised hundreds of kids from local schools and it became one of our most successful rallies.

I fondly remember him sharing newspaper cuttings of the first ever global tiger summit in 2010 held at St. Petersburg, Russia, when 13 tiger-range countries endorsed a Global Tiger Recovery Programme. Ambika Sir said we were on the right track and that we were already working toward a tiger recovery in Panna. He would say that the Panna Nature Camps had extended his life by a decade, by encouraging him to become a nature-teacher. For me it was the reverse – having such a dedicated teacher as part of the Panna reconstruction process added so much to my strength.

Panna's tiger numbers gradually improved and helped Madhya Pradesh regain her 'Tiger State' title in 2019. People like the late Ambika Prasad Khare and Devidutta Chaturvedi were key bridges connecting people with the park, and turning the Panna tiger reintroduction into a real *"Jan Samarthan se Bagh Samrakshan"* (Tiger Conservation with People's Support) model. I hope this example will be emulated by all in the future, for there could be no better homage paid to this great soul.

Born in 1932, Ambika Khare's schooling was completed in Panna before he left for Rewa for his intermediate education in 1953. He became an educator by 1954 and simultaneously graduated from the Sagar University with a B.A. in English Literature, and then a B.Ed. from the Regional College of Education, Bhopal. An amazing academic, he also completed his L.L.B. as a night student, and then L.L.M. as a private student. A follower of Aurobindo, he believed in yoga and lived a peaceful, ethical life, ably supported by his wife Sahodra and his children, Poorna and Ritam. After 31 years of service, he opted for voluntary retirement in 1985 to establish the Shri Aurobindo English Medium School in his own house in 1986. This turned into a Higher Secondary School in 2004. He greatly contributed to the education of Panna's young. Many of his students continue to shine including Devidutta Chaturvedi, a Presidential Medallist.



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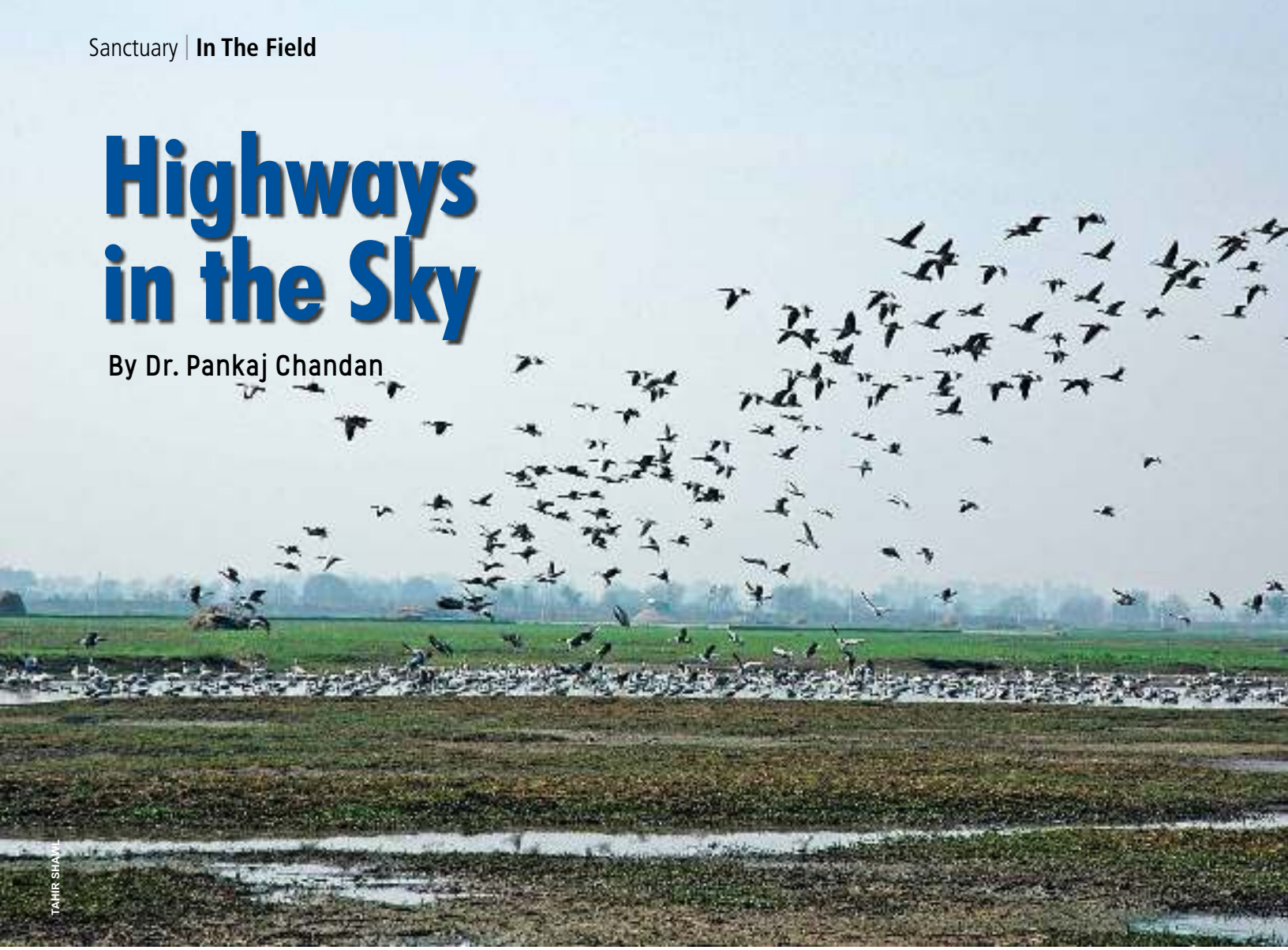
Highways in the Sky

By Dr. Pankaj Chandan



TAHIR SHAVL

Honks, squeaks and the rush of powerful wings resound as thousands take to the skies from the Gharana wetland. Autumn has just arrived and after travelling thousands of miles above the highest mountains in the world, the birds have begun to arrive from their breeding grounds in central Asia, northern Europe and Ladakh.

Over the years, my travels and work have transported me to different parts of the Himalaya. Some of my fondest memories are of time spent exploring two precious wetlands, one in J&K and the other in Ladakh, both stunning habitats for migratory birds. While Gharana in Jammu is vital to wintering migratory birds, Tso Kar wetland (see page 44) in Ladakh is critical to their breeding. For over two decades, I have worked on various research and conservation projects at both ecosystems that offered valuable scientific data and insights into the wildlife of these captivating landscapes. Beyond my work as an ecologist, I have also formed close associations with the local communities. Such indigenous people are a critical component of the wetlands.

ALONG INDIA'S BORDERS The Gharana wetland at an altitude of about 300 masl. is just 35 km. from Jammu town and is located a mere 500 m. from the Indo-Pak border at the foothills of the Himalaya. Driving from Jammu, one gets to traverse the world-famous basmati rice fields of the region.

The Gharana wetland is part of the East Asian-Australasian and Central Asian Flyways (see box on facing page and map on page 67). During any given day, flocks of Bar-headed Geese *Anser indicus* can be flying above, oblivious to all international borders. Bird banding studies by the Bombay Natural History Society and WWF-India have confirmed that some populations visit Tso Kar and other high-altitude wetlands in Ladakh in summer, thus confirming the vital ecological connectivity between Gharana wetlands in Jammu and Tso Kar wetland in Ladakh.

The Tso Kar wetland is part of the Tso Kar Basin, which has two wetlands: Tso Kar and Startsapuk Tso, connected through a freshwater channel. This rich wetland ecosystem, at 4,600 masl., is around 150 km. from Leh and is frequented in summer by

The Gharana wetland of Jammu is a part of the East Asian-Australasian and Central Asian Flyways and is a vital wintering ground for migratory birds such as the Bar-headed Geese Anser indicus. *The author (left) worked on bird banding studies in the region.*

Central Asian Flyway

The Central Asian Flyway (CAF) comprises several important migration routes of waterbirds, most of which extend from the northernmost breeding grounds in Russia (Siberia) to the southernmost non-breeding (wintering) grounds in West and South Asia, the Maldives and the British Indian Ocean Territory. The CAF is known to cover at least 279 populations of 182 migratory waterbird species, including 29 globally threatened species, which breed, migrate and winter within the region.

The Bombay Natural History Society's (BNHS) work for CAF

- Two scientists were deputed to work in the CAF India Secretariat to coordinate with the Convention on the Conservation of Migratory Species of Wild Animals (CMS), Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) and CAF Range Countries.
- BNHS was the lead member in drafting 'India's National Action Plan' (NAP) for conservation of Migratory Birds along the Central Asian Flyway' (2018–2023), which was launched by the Ministry of Environment, Forests and Climate Change (MoEF&CC) in November 2018.
- MoEF&CC has granted the project 'Implementing the Central Asian Flyway National Action Plan with Special Focus on Preparation of Site-Specific Activity Plan, Capacity Building, Developing Bird Sensitivity Mapping for setting up of Wind Energy and Species Action Plan' to the BNHS for supporting the state governments to implement the NAP at the ground level. The components being covered by BNHS are:
  1. Site specific activity plans for integrating NAP components in Protected Area Plans (both Management and Working Plans) and activity plan for the non-protected areas
  2. Capacity building of selected frontline staff with respect to CAF
  3. Preparation of bird sensitivity mapping for setting up of windfarms in India
  4. Preparation of Single Species action plan for the 20 CAF Action plan priority species.

Courtesy: Tuhina Katti, BNHS

Gharana's Winter Visitors

The Tso Kar wetland complex in Ladakh including Startsapuk Tso and Tso Kar, was declared as a Ramsar Site No. 2443 in 2020. The Gharana wetland in Jammu has been listed as a potential Ramsar Site (Islam and Rahmani 2008). Prominent migratory birds seen during winter months include Long-tailed Duck (vagrant), Gadwall, Ruddy Shelduck, Eurasian Wigeon, Mallard, Northern Pintail, Northern Shoveller, Red-crested Pochard, Common Pochard, Tufted Duck, Black-headed Ibis, Egyptian Vulture and Black-necked Stork. The best season to see almost all migratory wildfowl is from early February to end March, when northerly migration occurs from the plains and the valley to their breeding grounds.

There is an urgent need to develop wetland site networks for such wetlands having crucial ecological connectivity. Gharana's Ramsar status must be taken forward as this is an opportunity to highlight the high altitude and lower altitude wetland connectivity of two such sites through the migratory bird flyway.

Black-necked Cranes *Grus nigricollis* and Bar-headed Geese that use the wetland as their breeding ground. Rocky mountains surrounding this basin are frequented by birds like the Saker Falcon *Falco cherrug* and Golden Eagle *Aquila chrysaetos* for their nesting. This landscape also hosts the Tibetan argali, snow leopard, Tibetan wolf and lynx. The wetland basin is within the Changthang Cold Desert Wildlife Sanctuary on the border of India and China.

Gharana and Tso Kar are also critical sources of livelihood for local communities. Gharana regulates the hydrological regime of the region, influencing surrounding agricultural fields. Tso Kar provides valuable pastures to the local nomadic *Changpas* who rear their pashmina goats.

LOOMING THREATS Wetland reclamation and indiscriminate garbage disposal threaten Gharana. Local communities believe that wetland conservation could lead to loss of their lands and livelihoods. The approximately 120 families living in the immediate vicinity of the wetlands say they must contend with over 160 species of birds, that descend on this wetland, during different times of the year mostly during winter. At Tso Kar, unregulated developmental and tourism activities are key threats to migratory birds. In both places, the prevailing low-income status of communities has a direct implication on conservation of these critical wetland ecosystems. This situation could easily be changed provided policy changes make local communities the primary beneficiaries of tourism.

Marginalised communities living in these areas are part of the ecosystems and they could be the best care givers for this fragile landscape, through long-term conservation of the wetlands. There is little doubt that birders and naturalists from across India would flock to this incredible destination, which desperately needs professional ornithologists and tourism operators to work in unison.

Recent migration studies have established that Gharana and Tso Kar are connected through a bird migration route for the Bar-headed Geese, and both wetlands are crucial to their survival. This flyway connection virtually defines the ecological connectivity of both.

SECURING ECOLOGICAL CONNECTIVITY The flyways of migratory waterbirds, and their routes are umbilically linked to the health of the wetland habitat network along their flyways. These breeding and wintering grounds are invisible wildlife highways in the sky. Draining of such wetlands, intensive cattle grazing, and siltation are only some of the ecological stress factors facing these life-giving habitats.

India needs now to incorporate the Convention on Migratory Species (CMS) and the Ramsar Convention on wetlands to safeguard this irreplaceable natural heritage.

The author would like to acknowledge the Departments of Wildlife Protection in J&K and Ladakh, and WWF-India for support to research and conduct conservation activities at wetlands in the two Union Territories.

Dr. Pankaj Chandan is Senior Conservation Scientist and Director, Nature, Wildlife & Climate Change Programme of National Development Foundation (NDF).

From the Rooftop of India

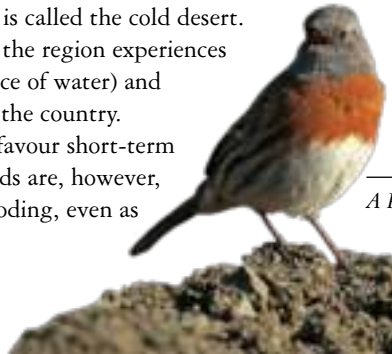
Wetlands and Waterbirds

A report by the Zoological Survey of India (2015 to 2019)

SAURABH SAWANT

By Anil Kumar and Iqbal Ali Khan

After crossing majestic mountaintops and fast-flowing streams, on July 19, 2015, we arrived at Sarchu, a small, temporary settlement at 3,000 to 3,650 masl. Entering Ladakh is a dramatic spectacle – the green valley gradually gives way to brown, and then grey, gigantic, granite and gravel. This rain shadow region of the Himalaya is called the cold desert. In winter (November to April), the region experiences frequent snowfall (its main source of water) and remains cut off from the rest of the country. Summers are short, bright and favour short-term cultivation. Recent climate trends are, however, causing unusual rainfall and flooding, even as



SURYA RAMACHANDRAN

A Robin Accentor

glaciers retreat. With every passing day the land turns more fragile.

In the last few years, we travelled across eastern Ladakh, including Pangong Tso, Tso Kar wetland, Tso Moriri, and Hanle. Armed with permits from the Deputy Commissioner of Leh, we left at dawn on August 2, 2015. In Zingral, an army camp, we watched the antics of the rufous-grey, furry marmots outside their deep, interlinked burrows where they hibernate in winter and store food. Shy of humans, the large rodents would dash into their burrows when we inched closer. We also spotted a male Chukar Partridge *Alectoris chukar* emitting feeble calls to a female foraging nearby, its neck outstretched and eyes shut. Close by we also spotted a Little Owl *Athene noctua* that flapped its wings and took off before we could photograph it.

On the way from Tangtse to Pangong Tso, we passed Muglib, a marshy area often favoured by Black-necked Cranes *Grus nigricollis* for foraging and when we reached the lake, we spent an amazing hour on its western shore. Pangong Tso, at 4,350 masl., is a magnificent endorheic lake (one that does not drain into the ocean), which extends across 604 sq. km., and is surrounded by scattered patches of dwarf vegetation. Roughly 60 per cent of the lake lies in Tibet and despite its salinity, the lake freezes over in winter. The brackish water supports very low micro-vegetation, but is a vital breeding site for a diversity of birds, such as Bar-headed Geese, Brown-headed Gulls, Common Terns and Ruddy Shelducks. Additionally, kiangs, mountain ungulates and Himalayan marmots also find sustenance in this austere paradise.

At such heights the weather is fickle at best and en route to our return journey back to Leh, our vehicle broke down near the army camp at Tsoltak. By the time we hitched a ride from a local, it had begun to rain heavily, followed by landslides. The night of August 3 was harrowing, but we finally reached Tso Moriri after a few days, on August 8. Fortunately, the highway had been cleared and we were able to find accommodation and food in temporary tents set up in Debring. A narrow, broken road then took us to a valley where we spent time observing kiang, the native wild asses of the Tibetan plateau, as they foraged on sedges and meadow grasses.

Later that day we arrived at Tso Kar, a brackish lake framed by bare, snowy tipped mountains. We were blessed here, with our first-ever sight of Black-necked

ABOVE *The Eurasian Magpie* Pica pica bactriana *is often seen in gregarious flocks near human habitation. An intelligent bird, it is one of the few non-mammals that can recognise itself in a mirror!*

TOP *Ladakh's rocky landscape offers this Little Owl* Athene noctua *a convenient perch to swoop down on unsuspecting lizards and other small prey.*

FACING PAGE *The Pangong Tso lake is the world's highest saltwater lake at 4,350 masl. Extending across eastern Ladakh and China, it is a vital breeding site for a diversity of birds including these Brown-headed Gulls* Chroicocephalus brunnicephalus.

The basin of Tso Kar marshes and the More plains constitute one of the most important habitats of kiang, Tibetan gazelles, Tibetan wolves and foxes.

SURYA RAMACHANDRAN

SURYA RAMACHANDRAN

TOP *The Startsapuk Tso and Tso Kar wetland complex support an abundance of birdlife including Black-necked Cranes* Grus nigricollis*, Great Crested Grebes* Podiceps cristatus *and gulls. These two connected lakes, one freshwater and the other hypersaline, were recently declared Ramsar sites.*

ABOVE *Besides avifaunal diversity, Ladakh's wetlands are important habitats for mammals including Tibetan gazelles* Procapra picticaudata*, kiangs, wolves and foxes. Male Tibetan gazelles have beautiful backward curving horns and migrate seasonally across the India-China border.*

Cranes! Anil, slowly and carefully waded knee-deep through the waters to obtain a low-angle shot of the distant and exceedingly graceful birds. The Tso Kar wetland is an otherworldly, mesmerising landscape. The two lakes here, Tso Kar and Startsapuk Tso extend over an area of about nine square kilometres, connected by an inlet stream. Interestingly, while Tso Kar is saline, the adjoining Startsapuk Tso holds freshwater.

The peaks of two mountains towered over the adjoining More plains – Thukje (6,050 masl.) and Gursan (6,370 masl.). The nomadic settlement of Thugje is located about three kilometres to the north. The microclimate is extremely varied, with winter temperatures plummeting to a bone-chilling -40°C, while summer temperatures may rise above a toasty 30°C, with extreme day-night fluctuations being the order of the day.

Hanle is a centuries-old settlement, recognised for the Hanle Monastery (gompa). The vegetation is thin, comprising willow and xerophytic dwarf bushes.

This isolated wonderland, which forms the basin of Tso Kar lake and the More plains, is one of the most important habitats of kiangs, or Tibetan gazelles, Tibetan wolves and foxes. We had a rich day, with sightings that included silver voles, Himalayan marmots, blue sheep and a flock of Bar-headed Geese en route to Tso Moriri.

Often referred to as 'Mountain Lake', Tso Moriri in the trans-Himalayan biogeographic region of Ladakh is flanked by bare, rocky mountains, wide sandy patches and sparse vegetation. Located at 4,522 masl. in Changthang plateau, it is an oligotrophic lake (having alkaline water) spread across 135 sq. km., which makes it India's largest high-altitude lake exclusively within Indian Territory. The waterbody is recharged by springs and melted snow, much of the water flowing in from two major streams from the north and southwest. Expansive marshes sprawl at the confluence of the premises and this attracts kiang that foraged on meadow grasses.

Though we intended to stay for several days, locals' warnings of further rainfall and landslides compelled us to leave Tso Moriri the very next morning on August 9. One night of traversing this tough landscape

in unforgiving terrain had been enough adventure for a lifetime! In the course of the day, we were gifted another sighting of a Black-necked Crane pair at Puga and then another at Tso Kar. Puga is a small marshy area, about a square kilometre in size, fed by a small snow-fed stream. The few water-logged areas, salt puddles and scrub vegetation supported both wild species and a few isolated agricultural fields, interspersed between barren lands.

RETURNING TO LADAKH The next year also saw us visit Hanle via Pangong Tso, Chushul, Loma and Rongo Track. On September 24, 2016, we reached Pangong Tso where we had a field day birding. We moved on to Chushul, where we observed still more avians – Bar-headed Geese, Common Mergansers, and Crested Grebes. At the Tsaka La valley, which connects with the Indus river valley at Thangra, we were greeted by finches, gulls, wheatears and waterfowl. We proceeded to Loma, located at the confluence of Indus and Hanle rivers. It is a huge marshy area surrounded by rocky, sandy mountains and is a breeding ground for Black-necked Cranes of which we spotted five individuals (no young), and noted with dismay the presence of feral dogs.

The marshy patches along Hanle river also support aquatic birds such as waders and ducks, while nearby rocky and sandy areas were preferred by wheatears, finches and other arid zone birds. Lal Pahari wetland between Loma and Hanle hold waterfowl and Black-necked Cranes. Hanle is an ancient human settlement, best known for its iconic Hanle Monastery (*gompa*). Here the vegetation is thin, comprising willow and xerophytic dwarf bushes. The marshes act as an important breeding ground, inviting Bar-headed Geese and Brahminy Duck in summers, and also mammals including Pallas's cats, kiangs and marmots.

We were fortunate to sight six Black-necked Cranes, including two young ones – two at the Startsapuk and Tso Kar lakes, and four at the Tso Kar wetlands. Towards Puga, three kilometres away, we saw silver voles and a small flock of Tibetan Partridges. Inching close to get a better look at the shy Tibetan Partridges, we suddenly noticed a huge pair of eyes close to us and spun around and instinctively shot off a few frames. It was a woolly hare! Motionless at first, it soon bounded away into the safety of some rocks. What an abundance of birds we saw – finches, sandpipers, wheatears, redstarts, pigeons, Brown-headed Gulls, Pallas's Gulls and Little Owls. Tso Kar and Puga also act as major breeding grounds for Black-necked Cranes, Bar-headed Geese and Ruddy Shelducks. How climate change is likely to impact such species and their migrations is what we need now to study and monitor, so as to come up with effective conservation plans.

We made one last trip to this stunning landscape before the pandemic upturned life as we know it. On May 24, 2019, we headed towards Tso Kar from Leh, surveying the Sindhu and Shey marshes, birding along the way. We were thrilled to see a pair of Ibisbill just about 30 m. away at the Indus river near Sindhu Ghat. We then proceeded to Rumtse village, the last human settlement before Tanglang-La Pass, a vast deserted plain where the only greenery we saw were small, perennial shrubs and herbs, mostly *Herasieum pinnatum, Caragana versicolor* and *Echinops cornigerus*, so crucial to kiang. We stopped to watch 16 of these magnificent animals in two loose groups near Debring before making our way to the Tso Kar wetland. Along the way we sighted the highly endangered Saker Falcon, so victimised by the illegal wildlife trade and the steady loss of its habitat.

On May 25, 2019, while birding near Tso Kar lake, about a kilometre's walk from our homestay, we heard the distant call of a Black-necked Crane and began walking towards it. After climbing a sand cliff, we spotted not one, but a pair of Black-necked Cranes and on our return were blessed by the sighting of a Little Owl, a stealthy hunter and a very quiet flier.

Ladakh is anything but a 'barren' land. To witness its diversity requires patience and an understanding of its ecological value. But as we sit here to pen this for *Sanctuary*, we realise with concern that virtually every species we saw and have written about here is vulnerable to the climate crisis. Quite literally, Ladakh is changing right before our eyes.

ANIL KUMAR

A pair of Black-necked Cranes at the Loma marsh.

The Black-necked Crane

Grus nigricollis

Distributed across Asia, it mostly breeds on the Tibetan plateau, including some wetlands in eastern Ladakh, and winters mainly in remote parts of the trans-Himalaya in India. The estimated global population of the Black-necked Crane is around 8,800-11,000. The species is listed in Schedule-I of the *Wild Life (Protection) Act*, 1972 and is listed 'Vulnerable' under the IUCN Red List. In selected wetlands in eastern Ladakh, the birds are often seen congregating in small groups. Anil Kumar recorded about 23 individuals. The authors' discussions with locals revealed that the local population may be around 51 individuals. Urbanisation, fencing around wetlands, shrinking of lakes, expanding agriculture and feral dogs threaten the population in Ladakh.

Anil Kumar is a senior scientist working with the Zoological Survey of India, Dehradun. He has been investigating the avifauna of western Himalaya, and behavioural biology of birds including acoustic communication. **Iqbal A. Khan** is a doctoral candidate, working on the behavioural ecology and distribution of the Eurasian Magpie in Ladakh. He has been closely associated with the wildlife census and awareness campaigns organised by Department of Wildlife Protection, Ladakh.

Recent climate trends are causing unusual rainfall and flooding, even as glaciers retreat. With every passing day the land turns more fragile.

On the Prowl

I left Srinagar at the break of a November dawn when it was biting cold. As Gurpal Singh maneuvered our Bolero through the serpentine Mughal road. I peered out expectantly, camera ready, for some sign of life among the tall conifers growing along the roadside.

I had started early hoping for good sightings and to cross the Pir Panjal mountain pass before snowfall or a landslide blocked our passage. Changes in Kashmir's microclimate, a result of the global climate crisis, have made such events more frequent and unpredictable.

We crossed into Shopian district and entered Hirpora village, much of which has been notified as the Hirpora Wildlife Sanctuary. The markhor is a flagship inhabitant of this montane coniferous forest, but that was not the animal we encountered. As Gurpal navigated the sharp curves along the sanctuary, he suddenly exclaimed, "Sir, cheetah!" There above a curve in the trail, half-hidden behind bushy vegetation and tall dry grass, was a leopard *Panthera pardus,* watching us.

Momentarily paralysed by the cat's unblinking gaze, I managed to shoot off a few frames in low light conditions with dark clouds hanging heavy above. Even as I heard the shutter, I wondered whether my images would do any justice to my fortuitous, and incredible encounter.

As for the leopard, he moved slowly and purposefully, to disappear behind a tree, not once taking his eyes off us.

And without uttering a word, Gurpal shifted gears and disappeared, from the scene, quite the way the leopard did… he to his emerald forest home and we to what wildlife adventures awaited us next.

PHOTOGRAPHER: Tahir Shawl
LOCATION: Hirpora Wildlife Sanctuary, Jammu and Kashmir
DETAILS: Camera: Canon EOS 750D,
Lens: Tamron SP 150-600 mm. F/5-6.3, Aperture: F/6.3,
Shutter speed: 1/160 sec., ISO: 800, Focal length: 256 mm.
DATE: November 1, 2020, 8:05 a.m.

Leaves from the Past

DHRITIMAN MUKHERJEE

Sanctuary has had Jammu, Kashmir and Ladakh at its heart from the day it was born 40 years ago. Way back in the 1980s hundreds of Kashmiri children were part of our purpose and, as adults now, they continue to be strong pillars for Sanctuary. Down the years, many very dedicated and talented naturalists, photographers and scientists helped turn Sanctuary into what it is today, a credible, strong and determined voice for nature. From the following pieces Sanctuary readers might get some idea of the sheer width, breadth and depth of our relationship with the people and the wildlife of this, one of India's finest natural havens.

On our 40th Anniversary, we delve into time to bring you slices of wonder and purpose and deep insights into a mission with which the likes of the late Mir Inayat Ullah, former Chief Wildife Warden J&K, had entrusted us.

COURTESY: SANCTUARY PHOTO LIBRARY

COURTESY: SANCTUARY PHOTO LIBRARY

Vol. III No. 2, April/June 1983

The Hangul: Dachigam's Endangered Deer

By Joanna van Gruisen

Until 1947, the hangul were 'royal game' and the animals and forest enjoyed strict protection and care from the Maharaja. Between 1910 and 1934 all habitation was removed from the catchment area and the people were resettled on land outside (hence the name Dachigam or "10 villages"). There is no record of the number of hangul at this time but E.P. Gee estimated that at the turn of the century there may have been between 3,000 and 5,000 and in 1947, perhaps, between 1,000 and 2,000. Certainly, those who can remember those days, recall forests teeming with animals and say that the male stags' roaring calls during the rut were enough to keep one awake at night.

In the confusion of the years immediately following Independence, Dachigam and the hangul were unprotected and inevitably widespread encroachment and poaching took place. In 1954, E.P. Gee estimated that the hangul had been so decimated that only around 300 animals remained – a reduction of around 85 per cent in only seven years.

Being extremely wary creatures, living mainly in heavily wooded areas, it is difficult to make accurate, detailed observations of the deer. However, it did appear that during the rutting season single males and to some extent female groups also, would remain confined to specific areas. But these areas appeared to be non-exclusive and in one part, over a period of three weeks during the rut, three different males were seen at different times at the same place, each calling to others. However, we saw no direct confrontation. Occasionally, males will do battle and I watched one rather impressive shoving match between a large 10-pointer and an 11-pointer stag during the 1981 rutting season. This is a rare sight as the calling serves to keep males separate and maintains the hierarchy. The general rule seems to be that the large males consort and mate with females first and on their tiring and moving away, to rest and feed on slightly higher slopes, the younger males move in to serve any females late in coming into oestrus. There are always exceptions and during the 1982 rut one large 10-pointer was seen, throughout the two month period, calling and relating to females. After the second week of October the number of rutting calls diminishes and comes to an end by the third week of November. (An odd call may be heard out of season – we noted one such call on February 15, 1982.) With the rut over and winter approaching, the hangul rest and feed. The Indian horse chestnuts now ripen and fall and are quickly eaten by the deer. In fact, it is from their partiality to these nuts that the hangul gets its name – "*han*" being the Kashmiri term for this tree.

Originally from the U.K., Joanna Van Gruisen has lived in the Indian subcontinent for over three decades. She is a writer, photographer and conservationist. Along with Raghunandan Chundawat, she runs an ecotourism venture near Khajuraho and the Panna Tiger Reserve.

LEFT *A young hangul* Cervus hanglu hanglu*, antlers still 'in velvet', in Dachigam. Some days later, its carcass was found when it fell prey to bears.*

RIGHT *A long-tailed marmot* Marmota caudata *in an upper Dachigam flower meadow. Marmots create burrows to stay safe from predators, including eagles.*

FACING PAGE *A row of brightly hued Himalayan bistorts or fleece flowers* Persicaria affinis, *grace the Zangskar valley, only a stone's throw from the Drang Drung glacier.*

ABOVE *The Dal lake supports a host of wild plants, including fox nut* Euryale ferox*, blue waterlily* Nymphaea stellate *and lotus* Nelumbo nucifera*. This popular tourist destination is also a bird haven with species such as the Common Moorhen* Gallinula chloropus *breeding in secluded spots along its shores.*

Vol. III No. 3, July/September 1983

Dal Lake: Mounting Burden and Diminishing Size

By A.K. Bhatnagar

The Dal Lake has its own bastion of majestic mountains. It skirts the Shankaracharya Hill and overlooks the picturesque Hari Parbat. Much of this splendid lake must have, at one time, been an undifferentiated marsh. However, the prosperous rulers of Kashmir had carried out works of reclamation long before the Mughals appeared on the scene. Lagoons and canals were scooped out and the mud was piled up to construct *bunds* or embankments.

King Pravarasena II, who founded a new city, Pravarpura, near Hari Parbat, had built a garden-house on the shore of the Dal Lake in the sixth century A.D., calling it Shalimar, the Abode of Love. In Pandit Kalhana's Rajatarangini, one of the oldest historical documents on Kashmir written in 1148 A.D., he mentions the construction of an embankment along the Tsont-i-kul canal, which took the surplus water of the lake to the Jhelum. This protected the Dal Lake and the low-lying parts of the city from the vagaries of floods in the river.

The Mughal emperors, Akbar, Jehangir and Shah Jehan, with their keen aesthetic sense and love for gardens greatly enhanced the grandeur of the Dal Lake. All around it they built several terraced gardens from which cascades of natural springs tumbled into the lake. Of the hundreds of such gardens, which once existed only a few like the Nishat, Shalimar and Chasma Shahi have survived. In the *Gazetteer of Kashmir* (1870-1872), Captain Charles Ellison Bates recorded that the lake extended 8-9.6 km. from north to south and 3-4.8 km. from east to west, and this covered an area of about 36 sq. km. The average depth of water was two-three metres, but at some points it was as deep as eight metres. By 1940, the lake had withdrawn dismally to 21 sq. km. and at present it has shrunk further to a bare 12 sq. km. Equally disturbing is the fact that at most places, especially in the Boulevard, Hazarat Bal and Gagribal neighbourhood, the water is scarcely 1-1.5 metres deep. Large parts of the lake have been replaced by floating gardens, or *radh* and encroachments and marshlands. The famed waterways, which were once compared to those of Venice and Amsterdam, are now choked with weeds. The water, which Bates had described as "clear and soft as silk", is now so heavily polluted that in some areas it looks and smells like sewage.

There is no doubt that this beautiful gift of nature, the Dal Lake, has been over-burdened for decades and is now fast losing its ability to sustain itself. As a result, the lake is not only diminishing in size, but its water has become dirty, foul smelling and a breeding ground for infections. While millions enjoy its exquisite beauty and thousands reap the gains of the tourist trade, none save some environmentalists, local officials and scholars seem to be adequately concerned about revamping the lake system. In view of the importance of the lake in the state economy, specially for attracting foreign tourists, the central and state governments should provide adequate funds for restoration and maintenance of its environment. The concerned government departments, research institutions, universities in the region and environmental agencies should formulate a joint strategy for preserving the grace and romance of the Dal. Or else, we will read eulogies on the lake only from historical records – future writings will be confined to obituaries.

Professor of Botany, University of Delhi, A.K. Bhatnagar has also served as Principal Scientific Officer in the Ministry of Environment and Forests.

Vol. XII No. 5, September/ October 1992

In the High Mountain of Ladakh

By R.S. Chundawat

The people of Ladakh, being mostly Buddhist, are averse to hunting and have lived for centuries in close harmony with nature. This is probably why it is relatively easy to see and approach wild animals here, unlike in other parts of the Himalaya where hunting and poaching is rampant. This was graphically brought home to us when we saw a herd of blue sheep pass boldly through a village in broad daylight. This is only possible where wild animals do not associate the locals with danger.

Humans obviously live in harmony with nature in the land of the snow leopard. Poaching is virtually non-existent and if it does take place, it is generally close to army settlements. The animals confirm this by their behaviour. They bolt at the first sign of human presence near army camps and outposts!

The snow leopard is only killed by villagers if it enters a pen and kills up to 25 or 30 sheep and goats in one fell swoop. The loss to the owner is inestimable and his reaction towards the predator totally understandable. Fortunately, however, such cases are rare and generally take place in an area of heavy snowfall, where livestock is cooped up indoors for the better part of winter.

The life-style and religion of the locals prompt them to look with benign tolerance towards wildlife. Their needs are simple – food, security and warmth – and they are among the most ecologically harmonised communities imaginable. Every last resource is used in the most economical way and waste is absent from their ethos. Sadly, the situation is changing rapidly, with changing social structures and life-styles. An increasing number of satellite townships and developmental activities have already begun to place pressure on neighbouring valleys.

The Ladakh urial has suffered the most from such change and if steps are not taken urgently this species might disappear within years. It has already been pushed out from its past range at several sites and now it occurs only in small isolated populations. The kiang, once distributed widely, has also been cornered into a few isolated valleys. Now it is considered a competitor for forage with large herds of domestic sheep and goats, which are famous for their beautiful pashmina wool and are a source of good revenue for their owners.

Very little has been documented about the ecology of this region and the study on the snow leopard was but one small step towards a better understanding of this unique ecosystem. The information already collected through our study will aid in the conservation of natural resources and the overall management of the region. Eventually, we hope a well-executed action plan can be initiated and that scientific management, which emanates from further studies will strengthen our effort to save these fragile mountains.

Raghunandan Chundawat is a noted tiger biologist and author of The Rise and Fall of the Emerald Tigers. *Along with Joanna van Gruisen, he runs an ecotourism venture near Khajuraho and the Panna Tiger Reserve.*

ABOVE *The jungle cat* Felis chaus *is found in wetlands across Southeast Asia. This agile cat is active during the day, preying on small mammals and birds and is capable of bringing down prey larger than itself.*

Vol. V No. 4, October/December 1985

Jasrota – Jammu's Forest of Peace

by Mir Inayat Ullah

Our jeep bumped along a *kutcha* road some 3.5 km. past Rajbagh, a village situated on the Jammu-Pathankot highway. Our destination was the right bank of the river Ujh, 70 km. north-west of Jammu. Here lay the historic Jasrota fort, now in ruins, and around it some of the finest forests of the region. I was surveying an area which had only recently been earmarked for protection as the Jasrota Wildlife Sanctuary.

A herd of chital *Axis axis* broke cover from my right and hurtled across the road in front of our jeep. As I sat back, basking in the pleasure of this commonplace sighting, I thought to myself how very vital it was that such pockets of green receive protection from the plough, the scythe and the machines of our age. The area was once a humming, buzzing centre of activity, as the capital of the Jasrota Jagir. The late Maharaja of Jammu and Kashmir, recognising its potential declared it as a Game Reserve. When India attained its independence the management of the park was transferred to the Forest Department, which allowed concessions for the extraction of bamboo and firewood and also permitted villagers to graze livestock within the forest confines. It was only in 1984 that the responsibility of managing the 1,004-acre forest was handed over to the Jammu and Kashmir Department of Wildlife Protection. As can be imagined, we have our work cut out for us. Restoring the habitat to its old prime condition will not be easy, and social pressures from the surrounding areas are going to add to our burden. But these are the challenges our department thrives on.

The Jasrota Sanctuary, in fact, is typical of the habitats to be found in the North Indian plains. *Acacia catechu* and *Acacia arabica*, typical dry zone plants can be found in association with shrubs such as *Lantana camara, Carisa spinarum* and climbers such as *Bauhinia vahlii*. The entire area is divided by the Daloti ridge. On one side of the ridge the flora and fauna have struck a good balance, and adequate wood cover is available to the denizens of the area. On the other side, however, where rich bamboo stands once reigned supreme, man's unwise attention has taken its toll. Degradation is obvious even to the untrained eye and here some amelioratory steps are definitely required. Native wild fruit and fodder plants will be reintroduced in a large way. Soil conservation steps such as the construction of check dams, and gully plugging will have to be undertaken. The ex-Maharaja had created some water points, which have now silted up. These will be cleared and renovated and will eventually benefit the animals as well as the people of the region who have thus far been denied a perennial water supply. The ground cover, of course, will help to further bind the soil and will eventually help to control the siltation taking place at the Ujh Barrage, which is today a heavy financial drain on the state.

Environmentalist and wildlife expert, the late Mir Inayat Ullah retired as J&K's Principal Chief Conservator of Forest (PCCF). He also headed the Department of Wildlife Protection for about 12 years and worked as Chief Conservator of Forests, Social Forestry and as a member of the Wildlife Board.

Vol. IX No. 2, April/June 1989

The Vanishing Musk Deer

by Vivek and Arati Sinha

"A thing of beauty is a joy for ever." So wrote Keats, well entitled to soar high on the wings of poetic fantasy. However, in the real world, beauty, especially wild beauty – must most often confront misery, not joy. Wild beauty brings with it a life of confinement, suffering, torture and eternal persecution. Wild animals, in fact, are likely to end up as ornaments – a purse, shoe, coat, an ingredient in some quack medicine, or a fixative in an exotic perfume. The musk deer is intensely hunted for the last two reasons and cannot escape the deadly reach of man, despite living in some of the world's most inaccessible areas near the tree line of the high Himalaya.

The species was once widely found over Central and Northern Asia, extending from Eastern Siberia to South-West China, Tibet and the full range of the Himalaya, except the Shivaliks. Extensive hunting, habitat degradation – especially of the under-story – by

livestock and deforestation by man have, however, reduced the musk deer population to the extent that it is now confined to a quarter of its original range in Northern India.

Aside from human depredations, the deer must contend with natural enemies, which include leopards, black and brown Himalayan bears, dhole and even yellow-throated martens, which can take young or wounded animals. Eagles and fox sometimes prey on fawns. Musk deer country is inhabited by several unique species and by protecting its habitat man offers protection to several other associated animals such as serow, goral, ibex, marmot, hangul and tahr. The magnificent Monal pheasant and Satyr Tragopan lend atmosphere and beauty to musk deer habitat and serve to form vital links in the fragile Himalayan tapestry.

According to Michael Green, who has studied musk deer on a WWF project, only 21 gms. of musk was extracted from 105 musk deer by 30 poachers. Out of every six deer killed by poachers, there is only one musk-carrying male, the rest are females and young. The amount of musk in a pod varies according to the season and the age of the musk deer. The poachers kill the deer indiscriminately by ensnaring them in traplines with spring-loaded nooses or by poisoned spears.

Musk was used in the East as an important ingredient in traditional medicines from prehistoric times. It is largely used as a dubious aphrodisiac, cure for fevers and cough, a general stimulant and antispasmodic and in the West as a fixative in expensive perfumes such as Chanel No. 5, Rochas' Madam Rochas, Guerlain's L 'Heure Bleu, etc. Scientific studies need to be carried out to find out the truth behind the eastern belief in its therapeutic efficacy.

Wildlife photographer and authors, this husband-wife duo based in Bengaluru have been long-time Sanctuary *contributors.*

Vol. XI No. 2, March/April 1991

Wetland Kashmir

By Dr. Kuldeep Singh Jamwal

Over the years, the vale of Kashmir has justifiably been accorded a very special place in the pages of *Sanctuary*. Today, with the rest of the nation, we mourn the fact that circumstances have led brother to fight brother in this once-tranquil haven. In time, we have no doubt that dignity and peace will return to the valley, when the bitterness and suspicion of yesterday is buried and emotional wounds heal over.

You can almost see them entering the valley from the north and the north-east, flying high over the icy pinnacles of the Great Himalayan massif on the eastern edge of Kashmir valley. Flock after flock, varying in size from a few hundred to several thousand, enter the valley with a chorus of honks and squeaks and a gushing rush of powerful wings. They are on their way to certain fixed destinations in the valley's vast network of marshes, ponds and lakes. Innumerable species of waterfowl – duck and geese – arrive just at the onset of autumn, migrating from Palaearctic breeding grounds in central Asia, northern Europe and, for some, even Ladakh, flying in right over some of the highest mountains on Earth.

I have watched the arrival of autumn and of waterfowl to Kashmir's famed wetlands for over four decades. Vivid memories slide back to the mind's eye. Spectacularly coloured autumnal skies, almost darkened with hundreds of thousands of avian wanderers, an apparently chaotic, yet obviously ordered mass, wheeling with military precision. On the ground, water bodies alive with dabbling duck and honking geese. Alas, few such awe-inspiring episodes of avian migration are enacted today, largely due to the deterioration of many of Kashmir's once splendid wetlands. Yet, waterfowl continue to grace the valley, albeit in diminishing numbers. Over the past few years, fortunately, the hand of man, the very hand that all but completely wiped out much of the original habitat, has begun to play an important role in securing the wilderness and thus the very future of the valley.

I have been a regular visitor to the Hokersar Wetland Reserve (see page 108) that nestles in the western part of the valley, at the foot of the Pir-Panjal mountains, barely 10 km. from Srinagar. On a late August evening, fewer than 15 small flights of Garganey left the reserve to forage in the fields around the Anchar and Shalabug wetlands. But on my second visit in the same season, by the end of September, the open water of the reserve was bedecked with the several flocks of pintail and coot, all basking in the late autumn sun. A few gadwall, wigeon, shovellers and pochard also made an appearance, but it is the Greylag Geese that I wait for most impatiently. These noisy birds arrive almost as if by appointment between 25 and 30, September. A magical replay of the clockwork precision of migration.

The moon-lit nights of late-October-early November bring in countless flights of mallard. After their marathon journey most birds spend their time preening and resting. Hokersar is now a spectacular sight with the snow-draped Pir Panjal looming through the mists, its sparkling waters teeming with almost 150,000 wildfowl. Occasionally, a hunting Marsh Harrier can now be seen sending thousands of waterfowl skittering over the water. A magnificent sight.

Dr. Kuldeep Singh Jamwal was born in Asham, Kashmir. A Professor of Physics and Electronics, he has been passionate about the state's natural wonders with a particular interest in its floral heritage. Now in retirement he enjoys painting and growing tuberous begonias.

Vol. XII No. 6, November/ December 1992

Blooming Survivors: the Bulbous Flowers of Kashmir

By Dr. Kuldeep Singh Jamwal

In Kashmir, the gentler foot-hills and slopes of the mountains encircling the valley are home to most of the local varieties of bulbous plants, which prefer soil conditions ideally provided by slopes. Here no water-logging takes place during winter snows and spring rains. And the dry conditions in summer encourage vegetative growth to mature. The areas bounding Zeberwan and Harwan around the eastern shore of the Dal lake are particularly rich in bulbous flora. The Chashmashahi-Harwan tract is home to the only truly local variety of deep maroon tulip – 'Mugal', which blooms in April. Numerous apple and almond orchards, besides the undisturbed open pastures are favourite areas where another local bi-colour tulip the 'stellata' grows in large numbers.

Local varieties of hyacinth and narcissus colloquially known as *sumbal* and *nargis* are very common in Kashmir and are greatly appreciated as cut-flowers whose fragrance is legend. *Fritillarias* (crown lily), *colchicum* and iris are also very common in the valley and are to be found in large established colonies in the local cemeteries. Commonly known as *mazaar posh* – flowers of the cemetery – they bloom in succession from February to May.

Melting snows and the consequent rise in day temperatures forces the first blooms of *chionodoxa* (glory-of-the-snow) and

TSEWANG NAMGAIL/SANCTUARY PHOTO LIBRARY

ABOVE *Tsewang Namgail and his field assistant scan for signs of wildlife on the Changthang plateau below them. The magical, icy wilderness of the Zangskar mountains supports all manner of species, adapted to survive against all odds in this seemingly barren and austere environment.*

Colchicum luteum in mid-February. This bounty of nature is much relished by the Redleged Partridge, the Chakor, which hungrily gobble the tiny flowers and bulbs. High in the mountains, late spring brings into bloom the foxtail lily *Erumurous himalyacus*, and many other varieties of wild alliums (onions), paeonias, anemones, ranunculas, trollius and frittilarias.

Many of Kashmir's exotic bulbs mentioned are presently under threat of extinction on account of human activities. The primary threat to the valley's wildlife and flora comes from growing pressure on land from agriculture and the biomass needs of a growing population. The last 10 to 15 years have witnessed a massive movement of people to the foothills and slopes encircling the valley. The inevitable reclamation of fertile slopes for horticulture and agriculture has adversely affected the fragile bulbs. Grazing by cattle and sheep in areas of wild bulbs has further reduced their numbers drastically, as cattle and livestock feed on the foliage thus robbing the bulbs of nourishment badly needed for reproduction. In any event, most bulbs in the wild reproduce slowly, the bulbils or off-sets taking between four to six years to mature. Thus, any disturbance in their habitat, no matter how seemingly insignificant, reduces their chance of survival. At much higher altitudes, rodents, koklas and Impeyan Pheasants and Snow Partridge, subsist mainly on alliums and other small bulbs. However, as is obvious from the fact that the flowers have survived together with such creatures for eons, they do not adversely affect the bulbs, upon which their own survival, in fact, hinges.

Vol. XXIV No. 6, December 2004

Zangskar: a Mystic Land

By Tsewang Namgail

A cold gust swept across the mountain face as we alighted from our jeep at Chiling, a small village encircled by towering mountains in the Zangskar gorge. British researcher Ashley Spearing and I were setting out on a survey of the elusive snow leopard *Uncia uncia* and its prey species in the Shun gorge. Barren as the mountain slopes seem, there are actually innumerable herbs and small shrubs that the wildlife depend on. Zangskar is known for its herb diversity, many of which have medicinal properties. Traditional Tibetan doctors or *Amchis* visit the area every year to collect herbs.

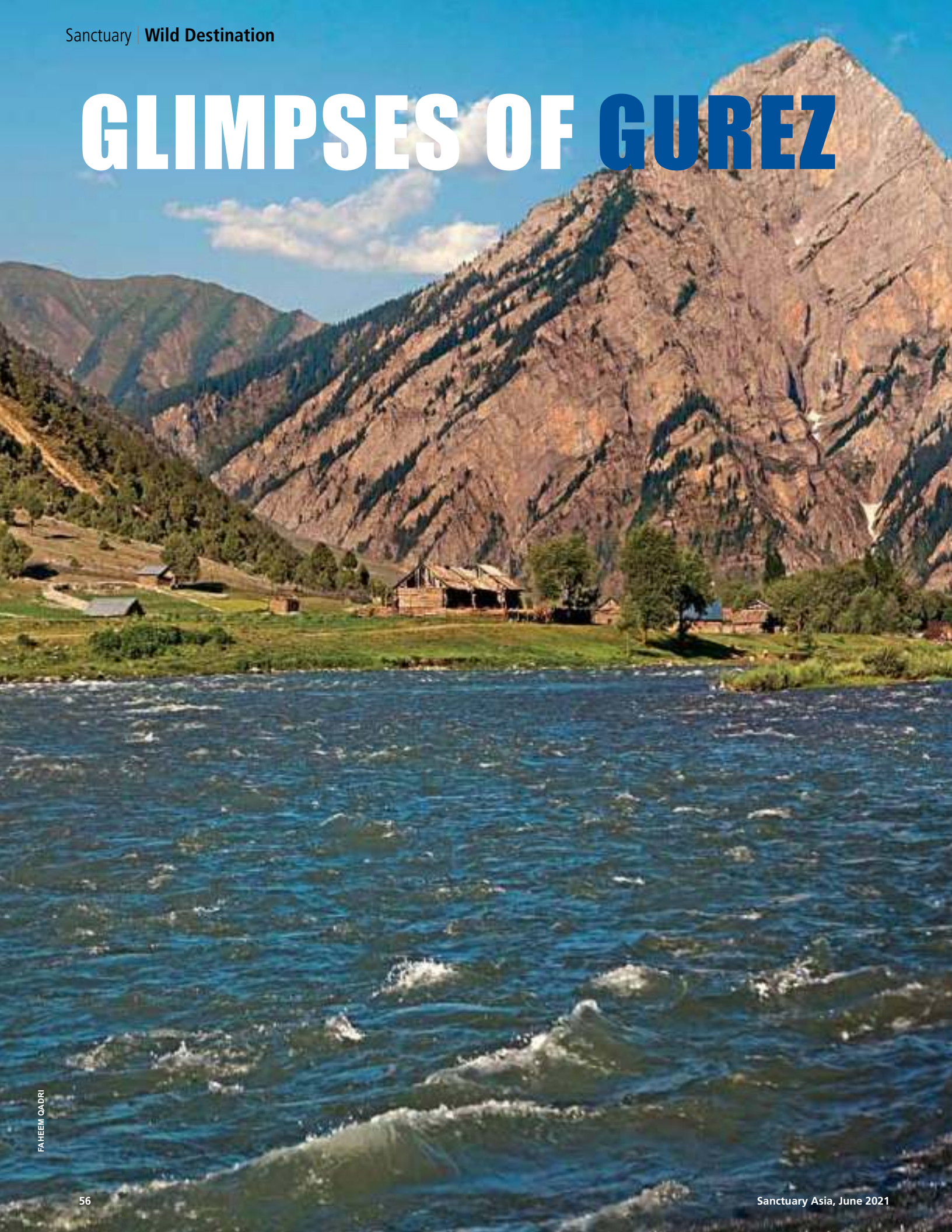
We walked slowly, surveying the area for snow leopard and other wildlife, stretching a five day trek to seven. Zangskaris normally complete the chadar trek in just three days! We passed a group of sturdy locals walking, would you believe it, barefoot through the slush covering the ice-sheet, to keep their shoes dry, the sharp ice lacerating their feet and tingeing the water with blood. A motorable road will be completed soon and after that only the most adventurous tourist might venture on to the chadar. My concern is that vehicular traffic will restrict the movement of species such as the snow leopard, which use the gorge as a transitory route, as indicated by the tracks, scrapes and spray-marks we saw along the river.

Almost every village in the Zangskar valley has a monastery, and the Phugtal monastery, which dates from the 11th Century A.D., is one of the most magnificent and holy. It is built in a cavern with the monk's quarters spilling over a cliff below. In the afternoon, we sat with some young novices, who were unimpressed when we told them about the red fox *Vulpes vulpes montana*, which we had spotted earlier. They suggested that we keep a lookout in the monastery precincts. Sure enough, we saw three foxes in the evening: a living testimony to the co-existence of man and beast in Zangskar.

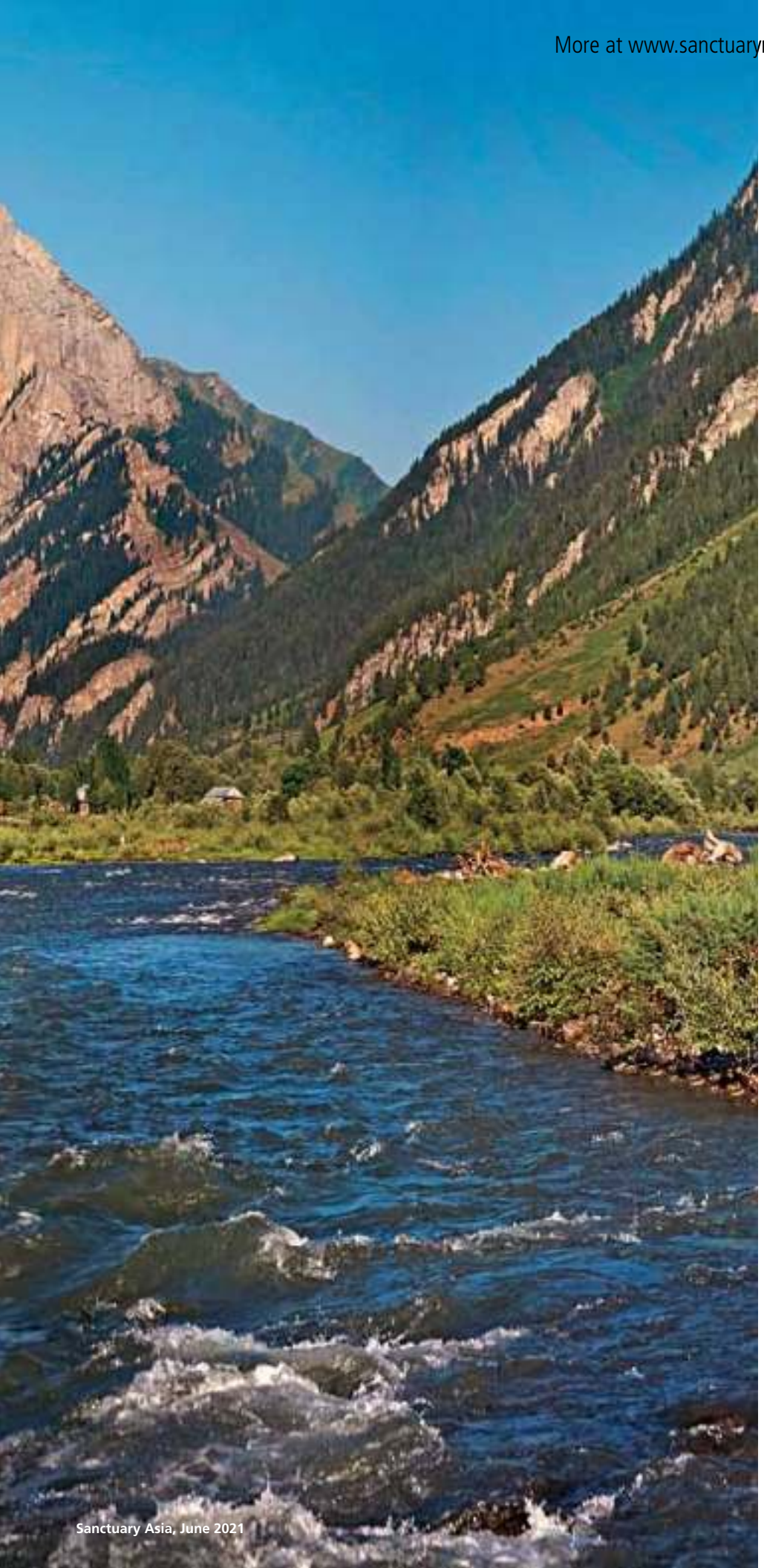
The icy wilderness of the Zangskar mountains is a truly mystical land, one where despite all odds, the snow leopard, ibex, bharal, fox and lynx continue to cling on to survival in a seemingly barren and austere environment. It is a place where ancient traditions and religious restrictions have ensured that most people continue to live in harmony with nature. The Zangskaris surely have much to teach the rest of the world…

Tsewang Namgail, is currently the Director of the Snow Leopard Conservancy Trust.

GLIMPSES OF GUREZ



FAHEEM QADRI



By Munib Khanyari

The environs of the Razdan Pass seem taken from a magical fantasy. At 3,557 masl. the pass is surrounded by vast rolling mountains as far as the eyes can see. This is the highest point along the Bandipora-Gurez highway that connects Srinagar to the remote Gurez valley. Driving through the pass, there is a sense of serenity. The highly respected Peer Baba who apparently came from Multan (Pakistan) in 1933 rests here.

After almost five hours of a back-breaking drive from Srinagar, we come to a bend in the road, and there before us, in all its awe, we see the mighty Habba Khatoon peak, named after the celebrated Kashmiri poet who loved the mountain. Towering over Dawar, the "capital" of Gurez valley, in 1976, the Habba Khatoon Drama Club was launched and played a pivotal role in safeguarding the cultural ethos and traditions of the *Dardi-Shina* tribe, the custodians of the Gurez valley.

The *Dardi-Shina* (also known as *Shin*), are *Dardic* people (Indo-Aryan) restricted to Southern Gilgit-Baltistan (Pakistan), Chitral (Pakistan), Kohistan (Pakistan), as well as Drass (India) and Gurez (India). They primarily speak the Indo-Aryan language *Shina*, which has several dialects.

Time stands still as one watches the glacial waters of the turquoise Neelum river flow along the Line of Control, through the Gurez valley. Upstream, lies the equally brilliant Tulail valley, sandwiched between Gurez to the west, and Drass (Mushkoh valley) to the east.

SHAKYASOM MAJUMDER

SATVIK SHAHPUR

Amongst many adjectives that can be used to define the *Shina* people, hardy and hospitable cannot be overstated. Surviving temperatures dropping below -30°C in winter, while cut off from the rest of the world for several months, is anything but easy. Whatever life might throw at them, the *Shina* will never miss a chance to sit with you, speak about the beautiful valley they call home, all while offering copious amounts of tea.

Time stands still as one watches the glacial waters of the turquoise Neelum river flow along the valley. Upstream, lies the equally brilliant Tulail valley, sandwiched between Gurez to the west and Drass (Mushkoh valley) to the east. Time and connectivity are relative concepts where phone connectivity only became available in recent years. The entire region falls along the ancient silk route connecting the Kashmir valley with Gilgit, before continuing towards Kashgar. It is hardly surprising that the region's historic importance is evidenced in the many archaeological sites found here – Kanzilwan, apparently, was home to the last council of Buddhism, and downstream lie the ruins of the ancient Sharda University (Sharada Peeth), now in Pakistan.

TURQUOISE VEINS OF LIFE

The rapids of the Neelum, meander their way through Gurez and its adjoining valleys and are home to a diversity of wildlife including the Himalayan ibex, musk deer, Himalayan brown bear and, potentially, even the snow leopard. Expert fishers the *Shina* supplement their diet with brown or rainbow trout that thrive in the glacial waters. Gurez is an Eden waiting to be explored. In the depths of winter, walking through the Kisar Nala just outside Dawar, the distant sounds of two ibexes locking horns in as they joust for a mate, reverberates across the mountains.

Locals have identified 56 different plant species, many used in ethnobotanic traditional medicine.

This is an austere, almost forbidding land and proximity to the Line of Actual Control (LAC) adds its challenges, what with cross-border incidents that locals must adapt to in Gurez. There are other issues, including the fact that organic waste attracts brown bears far too close to human settlements, particularly just before and after their winter hibernation, and this sometimes results in human-bear conflict. And then there are the large intrusions such as a hydroelectric dam, near Dawar, that has chiseled the earthquake-prone landscape and actually changed the course of the Neelum river. In an age of a worsening climate crisis, what does the future hold for wildlife and the people of Gurez, is anyone's guess, but lost in time and space, this region needs us to value its past, protect its present and work for its future.

Munib Khanyari is currently a Research Associate at Nature Conservation Foundation's High Altitude Programme and a Ph.D. student at the University of Bristol and the Interdisciplinary Centre for Conservation Science in Oxford.

FAHEEM QADRI

ABOVE *A group of young women from the* Dard *community watch animatedly at a performance by local artistes. Raising awareness about the importance of biodiversity conservation among locals is key to securing this landscape.*

FACING PAGE TOP *The construction of the 330 MW Kishanganga Hydroelectric Plant that chiselled the earthquake-prone landscape, led to the displacement of several villages, and polluted the waterbody, which a study by the National Institute of Technology had to declare 'unsuitable for human consumption'.*

FACING PAGE BOTTOM *The rapids of the Neelum, meander their way through Gurez and its adjoining valleys and are home to a diversity of wildlife including the Himalayan ibex, musk deer, Himalayan brown bear and, potentially, the snow leopard.*

Surviving temperatures dropping below -30°C in winter, while cut off from the rest of the world for several months, is anything but easy. Whatever life might throw at them, the Shina *will never miss a chance to sit with you, speak about the beautiful valley they call home, all while offering copious amounts of tea.*

The Hangul of Kashmir

In the snowy slopes of Lower Dachigam, Saurabh Sawant came across this hangul stag *Cervus hanglu hanglu,* with a female in tow (visible behind the branches on the top left).

The world's only population of the endemic and critically endangered hangul clings to survival in the small 141 sq. km. Dachigam National Park, close to Srinagar city. The name hangul, is believed to be derived from its favourite food, the Indian horse chestnut *Aesculus indica*, also known as 'Han Doon'; or its antlers known as *'heng'* in the local dialect.

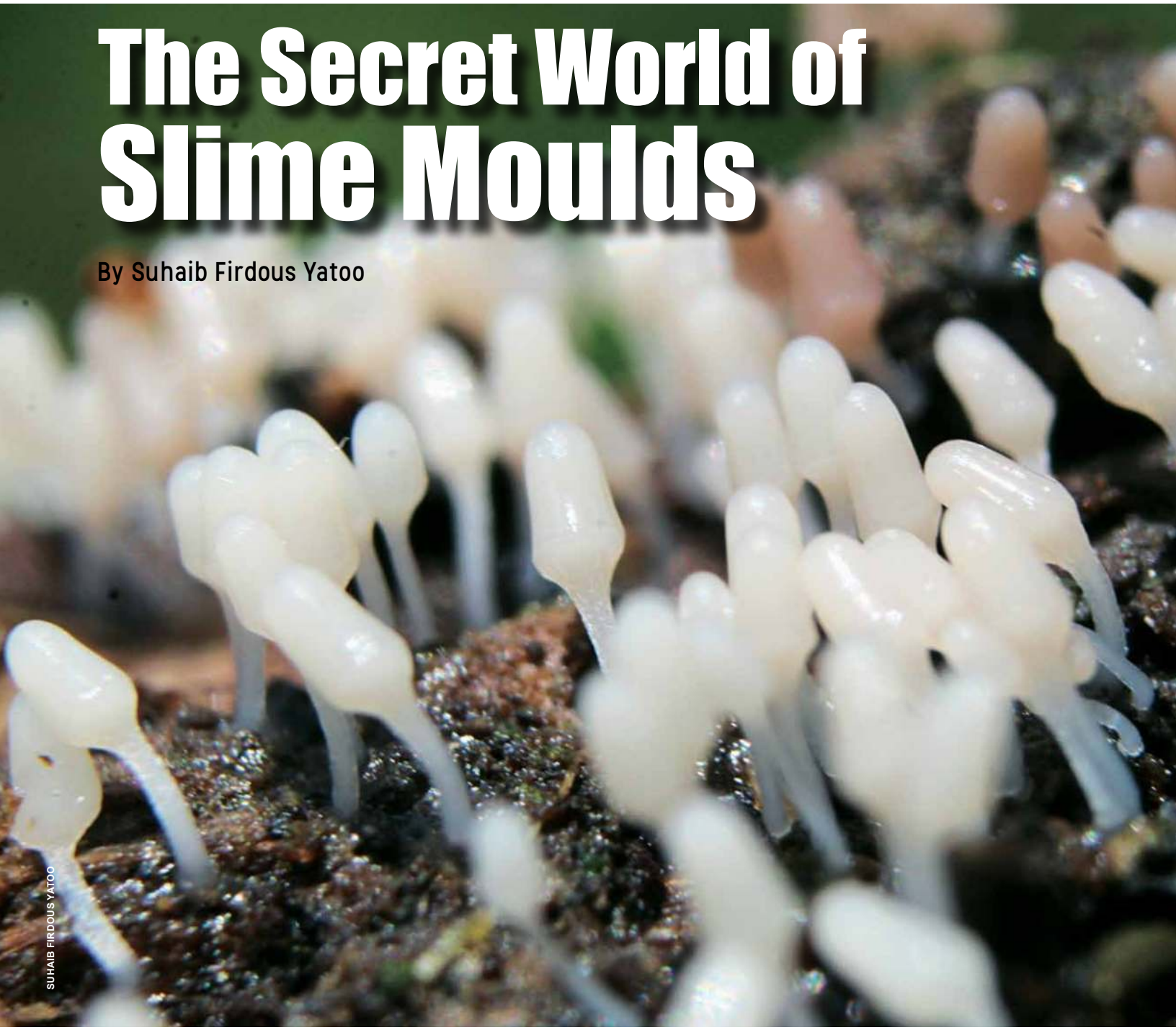
In summer, herds migrate to Upper Dachigam's alpine pastures and forests of fir, birch and spruce, where herbs, shrubs and grasses, help fatten them up for the winter. When snow clothes the high slopes and food is scarce, the deer descend to Lower Dachigam's oak and walnut forests watered by the Dagwan river from Harwan in the west to Waskar in the east. This magical natural wilderness supports Himalayan black bears, leopards, and an impressive avian diversity. Recently the efforts of dedicated state government officials and conservationists paid off by securing the relocation of a massive sheep farm in Lower Dachigam that had been negatively impacting the ecology of the Dachigam National Park for decades.

Dachigam and its network of Conservation Reserves including Dara, Khimber and Sharasbal are snow fed and form the catchment of the Dagwan river. This supplies much of Srinagar's drinking water before emptying into the Dal Lake. The Sanctuary Nature Foundation is working with the Wildlife Conservation Fund (see page 102) and local *Gujjar* and *Bakarwal* herders to establish the Dara COCOON Conservancy to create livelihoods and to regenerate the hillslopes vital to the health of Kashmir.

PHOTOGRAPHER: Saurabh Sawant
LOCATION: Dachigam National Park, Jammu and Kashmir
DETAILS: Camera: Canon EOS 6D, Lens: Canon EF 100-400 mm., Aperture: f/6.3, Shutter Speed: 1/400 sec., ISO: 100, Focal length: 400 mm.
DATE: January 28, 2020, 8:55 a.m.

The Secret World of Slime Moulds

By Suhaib Firdous Yatoo



SUHAIB FIRDOUS YATOO

Being a naturalist, my adventures to unravel the mysteries of nature have always led me to fascinating experiences. And with Kashmir – 'heaven on earth' – being my home, I have come to realise, firsthand, the truth behind the moniker. The area I grew up in, around the Rafiabad belt of Baramulla district, is dominated by apple orchards, forests and meadows, where I would spend countless hours exploring and collecting tiny creatures, studying each to the finest detail. I studied fungi, fell in love with dipteran eyes, marvelled at hymenopteran life and much more. Of late, I find myself thoroughly entranced by a group of minute organisms found usually in moist habitats. Slime moulds, technically known as myxomycetes (myxos for short) or Mycetozoa.

It all began in 2017, when I first spotted a tiny, glistening mushroom-like creature growing on a piece of moist wood, while looking for Ascomycetes (sac fungi). My interest was piqued when I learned that this creature was in fact another form of the

SUHAIB FIRDOUS YATOO

SUHAIB FIRDOUS YATOO

SUHAIB FIRDOUS YATOO

same slime-like organism that was creeping across the forest floor. How could a single organism exist in two different forms? I was intrigued, and wanted to find out more.

REAL LIFE TRANSFORMERS

Myxomycetes are a phylum under the kingdom Protista. These remarkable living beings show characteristics of both protozoans (single-celled microorganisms) and fungi. And they have the insane ability to change their physical form based on prevailing environmental conditions.

The pulsating network of slime that I saw that day on the forest floor can literally transform itself from an 'amoeba', a single celled organism, to an otherworldly creature. Yes, amoeba! A single-celled, phagocytic organism. In its amoeba-like stage, when this blob swarms and forages on bacteria and fungi, it is technically termed as plasmodium.

CLOCKWISE FROM FACING PAGE *Seen in three phases of maturity – immature fruiting body, a transitory phase and after spore dispersal,* Arcyria denudata *are usually found on decaying wood or bark in conifer forests. Slime moulds are single-celled protozoans with the ability to physically transform themselves during their lifecycles.*

FACING PAGE BOTTOM *Commonly known as coral slime,* Ceratiomyxa fruticulosa *is the only myxo genus that has spores borne on branches instead of growing inside a closed structure.*


AMIR MAQBOOL


OVAIS SHAFI

TOP LEFT Lamproderma scintillans, *a small slime mould at about one millimetre height, has a distinctive physical appearance with a sporangium globose tinted brownish, reddish, or bronze, sometimes even steel-blue and iridescent. It is usually found on dead leaves, and is one of the author's most prized collections.*

BOTTOM LEFT *Kashmir's landscape, with moist forest trails clothed with apple orchards, good glacial cover and high humidity provide the ideal conditions for different species of slime moulds to thrive. Some may even be found growing simultaneously on the same piece of log. The author has a personal collection of 70 species, all collected from the Zaingeer belt, in north Kashmir's Baramulla district.*

Myxomycetes are a phylum under the kingdom Protista. These remarkable living beings show characteristics of both protozoans (single-celled microorganisms) and fungi. And they have the insane ability to change their physical form based on prevailing environmental conditions.

When food becomes scarce, it brings its 'primitive cognition' to action and transforms into a procreative, shimmering, mushroom-like creature (which could sometimes resemble the appearance of scrambled eggs) to disperse its propagules, the spores. This stage is the fruiting body. That's not all. If the conditions aren't favourable – for example, if the temperature is too high or low or there is not enough moisture – the slime can turn into a hardened mass termed as sclerotium, a dormant form. Once favourable conditions return, the mass softens and the slime returns to life.

Given all these strange characteristics, classical taxonomists are puzzled about the correct taxonomic position of these 'critters'. Even though they are fungus-like in appearance and animal-like in their feeding behaviour, they don't seem to fit in with either. These creatures are unlike anything else on our planet. They were classified once as fungi but are no longer recognised as such, although the taxonomy, including the classification, is wholly based on their fungus-like stage. They are 'acellular protists', kingdom Protista – a non-phyllogenic assemblage of unrelated organisms.

MYXOS IN INDIA Myxos have received very little attention from Indian taxonomists thus far. There are less than 400 reported species from India and less than 40 from Kashmir, when in fact, without exaggeration, I have more than 70 just in my own collection, all of which I collected from suburban areas around Zaingeer belt alone! The reason I have made mere approximations in statistics is because there are no revisions in this particular taxonomic domain from India. Many of the specimens described from India

Collection and Preservation of Myxomycetes

It is said that 'beauty is always short-lived'. We wish to preserve ephemeral beauty, but it is not always possible. But in the case of myxomycetes, it is very much so. They can last up to a century or more if preserved in the right conditions. And, unlike other preserved organisms, can be resurrected too!

Collecting these delicate miniscule organisms is an art. And it depends completely on the collector's experience and technique. The collector must carry a scalpel, a small saw and small vials (I usually use saffron vials). Specimens must be collected along with the substrate. Only mature specimens must be collected for preservation while the ones not mature enough should be collected separately and, with utmost care, placed in a humid jar (to prevent desiccation) along with the substrate. Once collected, the specimens must be stuck to the vial base using an adhesive and then placed in a refrigerator for some time. But care must be taken to prevent any moisture. And then the specimen should be dried below 40°C. The immature ones collected should be placed in a moist chamber (plastic box with wet tissue in it) to complete their growth.

The specimens collected and preserved well can be resurrected by providing them the optimum conditions or by culturing them on agar plates.


COURTESY: SUHAIB FIRDOUS YATOO

are not considered valid due to the reluctance of experts to rectify errors and respond to the queries of amateurs. *Crateriella*, for instance, is a genus described from India but has no existence according to the latest nomenclatural code (see the website www.nomen.eumycetozoa.com). There are more examples and each case is corrigible. There is not even a single book published till now on Indian myxomycetes. They need more attention and research, and funding from agencies.

There is not much data available regarding the role of myxomycetes in a given ecosystem. They are neutral organisms that feed on fungi and bacteria while serving as food for the same sometimes too. Only few myxomycetes have been studied enough for the scientific community to realise some interesting traits they possess – for example, *Fuligo septica*, commonly known as the scrambled egg slime, is believed to absorb heavy metals from the atmosphere and can be used to monitor atmospheric pollution. There are no specific threats that harm their existence, except of course for the usual culprits – habitat destruction and the loss of glacial caps to climate change.

NOT EVERY SLIME, NOR EVERY MOULD, IS A SLIME MOULD

Although cosmopolitan, myxos can be located in swarms (in large numbers), on moist forest floors, dead wood, rotting leaves, on fungi and elsewhere. They are by no means confined to moist habitats only, with some myxos even occurring in deserts!

Looking for myxos requires an experienced eye – one must be able to discern them from the slimy trails of snails, slime flux, cellular moulds and some food left-overs. Slime flux, commonly called bacterial wet wood, can sometimes be mistaken for a plasmodium-stage myxo, but it has no particular structure like that of a plasmodium and is always found on injured trees. It's an association between fungi and bacteria. An experienced eye can easily differentiate myxos from cellular moulds. Most of the slime moulds are not even slimy.

KASHMIR, THE MYXO HEAVEN

Kashmir in particular is a haven for myxomycetes, being dominated by forests, apple orchards, and with good glacial cover and high humidity. These tiny, overlooked, evanescent organisms can be located in large numbers on a single log of wood with numerous different species thriving together. You need to be a 'leave no log unturned' kind of a person to get a good collection of myxos. Wet forest floor with a variety of litter cover is ideal for diverse myxo growth and one would never fail to find such places in Kashmir. Some rare myxomycetes, being nivicolous (inhabiting regions above the snowline) in nature, would always prefer to grow around the edges of glaciers in Kashmir.

At present, my personal myxomycetes collection is from a single patch of land having only deciduous forest litter. My most prized collective that has always been the centre of my fascination is a sample of Lamproderma (a genus of slime moulds in the family Lamprodermataceae), which has an iridescent disco-ball like structure standing on a mini-pole.

I'm hoping to increase my area of observation and diversify my collection in the coming years and am working on creating my own photography setup, so that we could turn our collections into a book-cum-field guide, which would be the first of its kind from India and would help to bring these unexplored organisms to the limelight.

The sheer beauty, diversity, unpredictability and ambiguity of myxos makes them, to me, the most interesting creatures on planet Earth.

Myxos have received very little attention from Indian taxonomists thus far. There are less than 400 reported species from India and less than 40 from Kashmir, when in fact, without exaggeration, I have more than 70 just in my own collection, all of which I collected from suburban areas around Zaingeer belt alone!

MONITORING TRANS-HIMALAYAN MIGRANTS IN LADAKH

By Simon Delany

CHARLES WILLIAMS

In 2013, **Simon Delany** received an email from Praveen J., Associate Editor of the journal *IndianBIRDS*, requesting historic details of bird species he and birder colleagues had recorded in Ladakh as young graduates of Southampton University in the 1970s and 1980s. Over the course of three expeditions, they had documented over 130 species migrating through the region, and individually marked nearly 8,000 birds with rings provided by the Bombay Natural History Society.

Over the course of three expeditions, we recorded over 130 species migrating through the region, and individually marked nearly 8,000 birds with rings.

CHARLES WILLIAMS

JOHN NORTON

COURTESY: JOHN NORTON

TOP RIGHT *Simon Delany and Clive Denby observing migrant swallows and martins brought down by cloudy weather at the Thikse plantation in the upper Indus valley, in the autumn of 1980.*

BOTTOM RIGHT *Ornithologists (left to right) Keith Godfrey, Simon Delany, Paul Harvey, Clive Denby and John Norton photographed in 1980 on the veranda of the Forestry Department hut that was the expedition base.*

FACING PAGE TOP *The Forest Department-run Thikse plantation in 1977, looking south towards the Zangskar Range. The combination of wetland, scrub and low tree habitats on the banks of the Indus river provide an excellent area for migrant birds to rest and feed.*

FACING PAGE BOTTOM *This Common Redstart* Phoenicurus phoenicurus*, the first recorded in India, was trapped and ringed on May 25, 1982. It was on its way to its breeding grounds in the Siberian forests from the wintering area in sub-Saharan Africa.*

EXPEDITION LADAKH

I had developed a fascination for migration across the Himalaya after reading Horace Alexander's *Seventy Years of Birdwatching* published in 1974. Alexander was a teacher, writer, pacifist and ornithologist who spent many years in India during which he even became friends with Mahatma Gandhi. His book drew attention to the readiness of some migratory birds to follow a direct route to their destination, even over high-altitude barriers. Alexander described how in late May and early June, he had often observed swallows, martins, swifts, warblers and Golden Orioles in the western Himalayan foothills above Dalhousie in Himachal Pradesh, at 2,450 masl., flying directly towards the high ranges.

Alexander's account somewhat contradicted the *magnum opus* of Reginald Moreau, *The Palearctic-African Bird Migration System*, a masterpiece of scholarship published in 1972. This book described how migrant birds breeding in northern Asia avoid the Tibetan-Himalayan region by taking routes to the east and west, and concluded that there was "virtually no evidence" of migration by a significant number of passerines across this extensive high-altitude region.

The migrants described by Horace Alexander would have reached Ladakh from Dalhousie with a flight of less than 200 km. across the Great Himalaya. During a preliminary visit to Ladakh in 1976, my friend Clive Denby had recorded migrant waders in the upper Indus valley. It seemed likely that an expedition to Ladakh, adopting an intense and systematic approach to the recording of migrants, would make interesting discoveries. Our 1977 expedition established a migration watchpoint in a Jammu and Kashmir Forestry Department plantation, close to Thikse village in the upper Indus valley, 18 km. from Leh at an altitude of 3,300 masl. We set up our mist nets in the plantation and opened them every morning at dawn during the autumn migration seasons of 1977, 1980 and 1981. We observed and recorded birds throughout the hours of daylight every day, often walking a 10 km. stretch

The world's bird migration systems have been divided into so-called 'flyways' to provide a political and legal framework for international cooperation in the conservation and management of migratory birds.

JOHN NORTON

CLARE SULSTON

JOHN NORTON

ON THIS PAGE *The Common Snipe* Gallinago gallinago *(top left) was recorded occasionally in small numbers at the Thikse plantation. The Güldenstädt's Redstart* Phoenicurus erythrogastrus *(above) is a winter visitor to the upper Indus valley in large numbers from breeding sites at high altitudes. The two records of Sedge Warbler* Acrocephalus schoenobaenus *(top right) by the author and his team remain the only Indian records of this species to date.*

of the valley down to Choglamsar in the afternoons. In 1981, we extended our stay through the winter and continued working through the spring migration season of 1982. Our expeditions were supported by a number of organisations and institutes including the Smithsonian Institute and the British Ecological Society. We produced comprehensive unpublished reports for these funders, but we were unable to obtain funding for formal publication of the results.

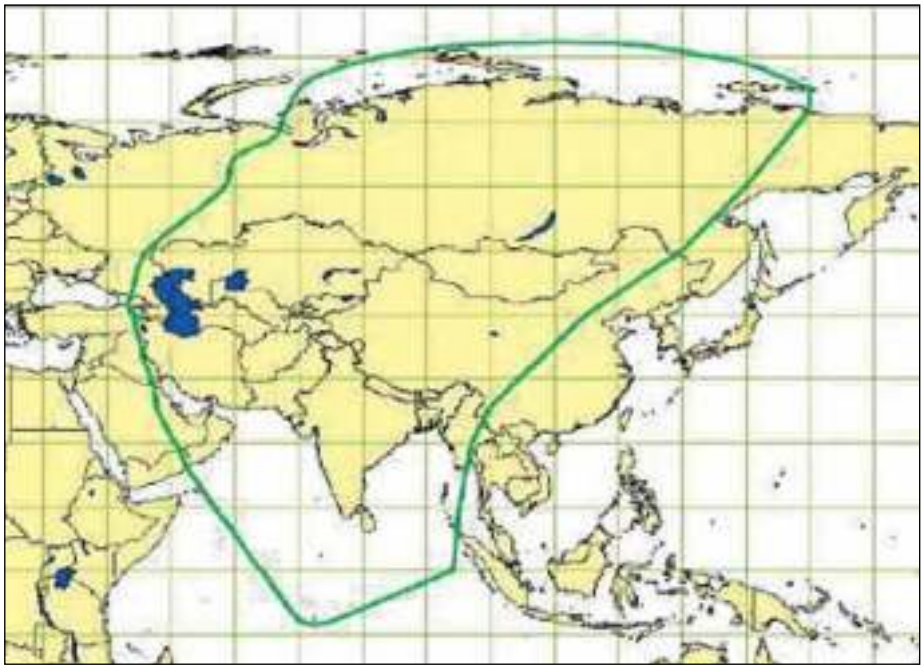
FOLLOWING AVIAN MIGRANTS In response to Praveen's email, I wrote a paper for *IndianBIRDS* in 2014, which provided details of nine of the 10 species recorded in India for the first time (the 10th, Naumann's Thrush *Turdus naumanni* was added in 2017 as a result of a taxonomic split). The nine first records for India were the Lesser Grey Shrike *Lanius minor*, Great Reed Warbler *Acrocephalus arundinaceus*, Black-browed Reed Warbler *Acrocephalus bistrigiceps*, Sedge Warbler *Acrocephalus schoenobaenus*, Garden Warbler *Sylvia borin*, Song Thrush *Turdus philomelos*, Common Redstart *Phoenicurus phoenicurus*, Eurasian Linnet *Linaria cannabina*, and Yellowhammer *Emberiza citrinella*. Most of these species have since been observed elsewhere in India, but our two records of Sedge Warbler remain the only Indian records of this species. Five of the species recorded in India for the first time were migrants that breed in Siberia and winter in Africa, unexpectedly taking a route through the Ladakh trans-Himalaya. Altogether, we found 18 species that breed to the north of the Himalaya and winter in Africa, migrating through Ladakh.

A special feature of the ornithology of Ladakh is the altitudinal migration that brings species that breed at extreme altitudes down into the valleys for the winter. At this time, the Thikse plantation and other valley bottom sites host large numbers of Güldenstädt's Redstarts *Phoenicurus erythrogastrus*, Brown Accentors *Prunella fulvescens* and smaller numbers of other species.

We described the migration patterns of many species, and noted how cloud cover and rain increased the number and diversity of migrants recorded, suggesting that in clear conditions, migrants pass over at high altitude without stopping. We concluded that – as observed by Moreau – a sizeable majority of migrants appear to avoid the Tibetan-Himalayan region, but that a large number of a high diversity of species nevertheless pass through or over the mountain ranges. Trans-Himalayan migration therefore probably takes place

We speculated that a minimum of 1.4 million waders might be passing over the Tibetan-Himalayan region each autumn.

COURTESY: CLARE SULSTON



MAP SOURCE: CAF ACTION PLAN, NEW DELHI, 2005

ABOVE LEFT *Clare Sulston carefully extracts a bird from a mist net in September 1981. The team installed the nets at Thikse, and would open them at dawn each morning, then check them every half hour. Mist netting is a capture method commonly used by trained scientists studying wild birds and bats, who individually mark and measure their study subjects before quickly releasing them back into the wild.*

ABOVE RIGHT *The migratory routes of the Central Asian Flyway begin from northerly breeding grounds across Siberia and extend down to wintering grounds in South and West Asia, on the mainland and neighbouring island chains.*

on a previously unrecognised scale. To take the example of one group – waders (shorebirds) – we recorded 27 wader species migrating through Ladakh, but only four were seen frequently, namely, in order of abundance, Green Sandpiper *Tringa ochropus*, Temminck's Stint *Calidris temminckii*, Wood Sandpiper *Tringa glareola*, and Common Greenshank *Tringa nebularia*. We speculated that a minimum of 1.4 million waders might be passing over the Tibetan-Himalayan region each autumn – a small but nevertheless important proportion of the waders that migrate out of Siberia. These findings have recently been reinforced by the work of David Li and colleagues, who used satellite telemetry to track Common Redshank *Tringa totanus* and Whimbrel *Numenius phaeopus* migrating over the Himalaya from their wintering grounds in Singapore.

CONSERVING FLYWAYS

The world's bird migration systems have been divided into so-called 'flyways' to provide a political and legal framework for international cooperation in the conservation and management of migratory birds. Each flyway comprises the broadly similar migratory routes followed by many different species, and includes all the sites and habitats used by these species throughout the annual cycle. India is the destination of a high proportion of the millions of birds that use the Central Asian Flyway (see box on page 43), and the Tibetan-Himalayan region forms a barrier that spans much of the mid-latitude part of this Flyway. The Government of India, as a signatory to the UN Convention on Migratory Species, recognises its responsibility to conserve the Central Asian Flyway migration system. At the 13th Conference of the Parties to the Convention in Gandhinagar in 2020, the Prime Minister of India referred to this responsibility in a keynote address, and implementation of the long-delayed Central Asian Flyway Agreement is keenly anticipated. Nishant Kumar and colleagues recently tracked the high-altitude migration route used by hundreds of thousands of Black-eared Kites *Milvus migrans lineatus* wintering in Delhi to widespread breeding sites ranging between Kazakhstan and Mongolia. Despite its scale, this migratory route was completely unknown until the study was published in 2020, and this pioneering work drew attention to the urgent need for more research and monitoring on this flyway.

It was wonderful to delve into our archive and review our results for the 2014 *IndianBIRDS* paper, and contributions to the 2017 book *Bird Migration Across the Himalayas*, edited by Herbert Prins and Tsewang Namgail. It brought back memories of exciting times in the field, making discoveries in spectacular landscapes with dear friends, and also of the warmth, hospitality and good humour of the Ladakhi people among whom we lived and worked for a total of nearly two years. After the award of the Ph.D. that has been keeping me busy in my spare time for the past seven years, I hope to return to Ladakh to discover how things have changed since our expeditions all those years ago.

Our two records of Sedge Warbler remain the only Indian records of this species.

JAINY MARIA

In search of the

The Magnificent Markhor

By Samyak Kaninde

It was the coldest winter in the Kashmir valley in the last 30 years when I arrived at Srinagar Airport in February 2021. So cold that the Dal Lake was partially frozen during '*Chillai-kalan*', the harshest period of winter that lasts around 40 days. I was here in search of a rare and elusive wild animal that I had wanted to sight for over three years – the markhor *Capra falconeri*, the world's largest mountain goat.

Like most high-altitude Himalayan wildlife, it is easiest to sight these animals when they descend from their summer, mountaintop homes to the valleys in winter. The extreme cold in Srinagar was therefore reason to hope, as the animals would probably be lower down in the valleys.

WALKING THE HIMALAYA After securing the necessary permits to visit the Kazinag National Park, a markhor stronghold, I headed for Lachipora village in the Baramulla district. This quiet, picturesque Himalayan village, where step-farming is practised on mountain slopes, would be my base for a week. A small stream named Kazinag, originating from the Kazinag glacier, crisscrosses the village until it meanders down to meet the Jhelum river. Largely inaccessible, the high mountains around the village teem with wildlife such as the markhor, musk deer, goral and the apex predator, the common leopard. Soon after settling down, I set out in the evening to explore the stream and scan the mountains in anticipation of discoveries ahead. In the distance, I saw a herd of goral grazing peacefully on a slope, oblivious to our presence. The stream was partially frozen and we trudged through melting snow along a small trail that locals used to fetch dry grass for their cattle in winter. That evening I met Dr. Riyaz Ahmad, Head of the Markhor Recovery Project (see *Sanctuary Asia*, Vol. 38, No. 10, October 2018), for the Wildlife Trust of India (WTI). He has been studying the markhor for over a decade and I was fortunate to be invited to join him on a field visit the next day.

We set off early the next morning in the company of local forest guard, Latif, who has guided several researchers and wildlifers who come by his village. It was a tough climb up the mountain path, but we were rewarded by chance encounters with a small group of Kalij Pheasants and Himalayan Monals that Latif said were common to the area. Himalayan Griffons and Golden Eagles circled the sky above effortlessly, using thermals as large raptors do. Within an hour we were exhausted but glad to reach our campsite after tramping through knee-deep snow. Here we rested, at an inconspicuous wooded clearing where our presence was well hidden. Markhor are most active early mornings and late evenings, so we patiently waited for quite some time. The slopes where the markhor were most likely to be spotted were separated from our location by an expansive deep valley, making visibility and photography near impossible. But this was our best chance to observe the elusive goat, which sensibly stays away from humans whose presence it detects thanks to its incredible sight and strong sense of smell.

SAMYAK KANINDE

PATIENCE REWARDED We were blessed. The markhor did indeed make their appearance. First, one sub-adult male, then his small harem of females, with a few young in tow. Exhilarated, we reveled in the rare sighting and though we knew where they were, it took a while to actually spot them. Their incredible brown coat gives them the ability to virtually melt into the mountains. As we watched, we could not help but marvel at the way in which the sure-footed animals grazed nonchalantly on the near vertical mountain slope with intuitive ease. Through our field glasses we watched with bated breath as a sub-adult

PUBLIC DOMAIN/ KOSHY KOSHY

RIGHT *The Himalayan Monal* Lophophorus impejanus *prefers Himalayan hill forest areas.*

ABOVE *The author visited the Kazinag National Park in February 2021 in winter, when the landscape is cloaked in snow. As with most high-altitude Himalayan wildlife, it is easiest to sight the markhor when they descend in winter from their summer, mountaintop homes to the valleys below.*

FACING PAGE *Shy, gentle and majestic, the markhor* Capra falconeri, *is the largest wild goat species in the world. Males have distinctive corkscrew-shaped horns that can grow to 160 cm.! In India, the species is endemic to Kashmir.*

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SAMYAK KANINDE


DHRITIMAN MUKHERJEE

ABOVE LEFT *A female markhor, discernible by the smaller horns, navigates a near-vertical mountain cliff to graze with intuitive proficiency. Over the course of a week, the author was fortunate to spot several markhor herds.*

ABOVE RIGHT *Close to the Line of Control, the Kazinag National Park with its dense deodar, pine and fir forests and elevated cliffs, is one of the last remaining strongholds for markhor in India. About 200 individuals now survive here.*

male used his short hind legs to support himself while reaching far out for a morsel of grass. The young ones never wandered far from their mothers, almost tracing their footsteps, sometimes hesitant, and other times, hopping and skipping playfully about.

The best way to spot them, we learned, was to look out for their prominent black and white legs. Contented to watch the group, we were gratefully taken aback when a huge class four male made his appearance! As with other Capra species, male markhors are classified for their age by the length of their horns. The imposing male that held us in a hypnotic trance sported a huge horn with five twists, demonstrating why their corkscrew-like horns are such prized possessions. While observing him, five other males came into view. They were grazing in close proximity while the largest sat indolently on the slope. It was a rare and wonderful sighting because females most often form small groups with their young and move about, while adult males are solitary, some moving in bachelor groups away from the mixed herd.

Over the next five days, we explored different aspects of the valley and mountains where we saw several markhor herds. One sighting was particularly memorable. We were returning to the valley as excessive melting snow had prevented us from crossing a frozen, slippery stream. Scanning the nearby mountains, we found a lone female with two of her young moving along the vertical slopes, extremely close to where we were. We froze the moment we saw the family so as not to disturb them. Normally, females give birth in summer to a single young, rarely two. By the time winter arrives, kids follow their mothers down to the valley. At one point, we saw a kid stumbling on a rock and the mother immediately nudged her offspring towards a safe foothold. Latif reiterated how lucky we were to observe this family at close range. By now a cold chill had picked up as the sun sank lower on the horizon. Blessed, we

The best way to spot them, we learned, was to look out for their prominent black and white legs. Contented to watch the group, we were gratefully taken aback when a huge class four male made his appearance!

Markhor in Persian means 'snake-killer', named so for its mythical power of killing snakes with its horns and eating them. However, like other goats, the markhor is actually a herbivore that grazes on grass and leaves on mountain cliffs and slopes. Adult males can reach a height of 186 cm. at the shoulder, and have large corkscrew shaped horns that can grow to 160 cm.! This coupled with the long hair on their chin, throat, chest and flanks makes the species possibly the most majestic of the Capra genus. Females have much smaller horns, up to 25 cm. long, and have comparatively shorter hair.

Markhor are creatures of the high mountains. Scattered herds are found across the scrublands, open woodlands and mountains of central Asia, Karakoram and the Himalaya in Turkmenistan, Uzbekistan, Tajikistan, Afghanistan, Pakistan and northern India. Here, they are endemic only to Kashmir and found nowhere else in the country. Out of the three markhor subspecies recognised by the IUCN, the astor markhor or flare-horned markhor *Capra falconeri falconeri* is found in the Kashmir region. It is locally also recognised by another scientific name, *Capra falconeri cashmiriensis* or Kashmir markhor.

The markhor was declared extinct in India in 1997 and believed to be so until the Wildlife Trust of India's range-wide survey in Kashmir in October 2004 – April 2005 revealed the existence of the species. At present, a significant population of markhor, an estimated 200, are found in the Kazinag National Park (170 sq. km.), an improvement from the 130 estimated in 2005. Found in the Baramulla region, it is close to the Line of Control (LoC) bordering Pakistan, in one of the most hostile political regions in the world with frequent skirmishes with militants. Due to this, hardly any studies or information about India's markhor were available until the last decade.

The other parts of Kashmir where markhor can be found include the Hirpora Wildlife Sanctuary (350 sq. km.) in the Pir Panjal region, which holds about 35 markhor, and the adjacent Tatakuti Wildlife Sanctuary (70 sq. km.) declared in 2012, holds about 20 to 25 individuals.

looked forward to the warmth and comfort that awaited us after we covered the long distance towards our village camp.

On my last day in Kazinag, I was overjoyed to observe a group of nine strong class four males. This time the climb was tougher as we had to confront a small avalanche on the way. But everything was worth the sight of those magnificent mountain monarchs.

On our return, we were greeted by our host's grandmother who excitedly confirmed that as many as five markhors had approached the village, pointing to the slope where she had seen them. Peering through my binoculars I soon spotted one, a lone male, grazing peacefully. The others had become one with the mountain.

As I closed my eyes to sleep that night, I could not help but wonder whether the magnificent markhor would be able to survive the trials being placed in their way by *Homo sapiens*… the 'wise' ones.

Samyak Kaninde is a nature and wildlife photographer who splits his time between the Himalaya and forests around India. He loves to capture urban wildlife around his home.

Kashmir's second home for the markhor, the Hirpora Wildlife Sanctuary witnesses a summer influx of migratory herders and their livestock that graze on the sparse vegetation. The Wildlife Trust of India (WTI) works with these communities to address these and other threats.

WTI's Kashmir Markhor Recovery Project works closely with the Department of Wildlife Protection, Jammu and Kashmir, on both ecological and community conservation measures to save the markhor. In addition to the residential communities on the fringes of Kazinag and Hirpora, hundreds of migratory herders annually visit the year during summer months between late May to October. "These migratory herders, of the *Gujjar* and *Bakarwal* communities, come from the Rajauri and Poonch areas. Their livestock grazing causes competitive displacement of markhor from their key habitats. Additionally, timber extraction (of juniper, pine and fir) for firewood use and markhor poaching for meat and horns are significant threats," says Sameer Khazir, Field Officer of the project. He adds that of late, the migratory communities are also bringing in herds of outsiders and other landlords to graze for additional income, increasing the pressure on the land. "We're working with these communities to return them to their traditional herding practices. We are also linking them to welfare programmes like the Pradhan Mantri Ujjwala Yojana scheme, to reduce fuel-wood dependency. We recently distributed gas cylinders as well," he says.

Due to the stable population across different geographies, IUCN has downgraded the status of markhor from 'Endangered' to 'Near-Threatened' recently. However anthropogenic pressures on the animal including the development of roads (such as the Mughal road recently built through Hirpora, allowing easy access for migratory herders), infrastructure and mining pose new challenges for sustaining this small population.

"We have been able to highlight this species and its conservation in J&K, which has been important. The government is now interested in protecting the animal, and we are trying to work though there are many challenges. There is a lot more to do. For instance, though on paper the Hirpora Wildlife Sanctuary is about 350 sq. km, in reality not one kilometre is free of disturbances. Perhaps if at least 40 sq. km. can be made disturbance-free, it could have a great positive impact," says Dr. Riyaz Ahmad, Project Head.

It was a tough climb up the mountain path, but we were rewarded by chance encounters with a small group of Kalij Pheasants and Himalayan Monals that Latif said were common to the area.

Bears on the Edge

FACING A GRIM FUTURE

Text and photographs by Dhritiman Mukherjee

Veteran photographer-naturalist **Dhritiman Mukherjee** spent 15 years following Himalayan brown bears *Ursus arctos isabellinus* across Himachal Pradesh, Ladakh and Uttarakhand. Here he introduces us to what he calls "fringe bears" that live on the threshold between wild forest and human habitation in Drass, Ladakh. The proximity to humans has altered bear behaviour during hibernation because of free-ranging livestock and the ample food availability in garbage dumps. This could trigger greater conflict and impact the animals' health.

ABOVE *A bear scales a mountain ridge after spotting the photographer who manages to capture a fleeting moment against a pre-dawn sky. Bears habitually forage at Drass at night, returning to the safety of their forests when day breaks. This is relatively new behaviour, suggesting that bears are evolving new strategies to adapt to their anthropogenic environment.*

RIGHT (TOP, MIDDLE AND BOTTOM)
Soon after dusk, an agitated mother, cub in tow, frantically chases free-ranging dogs that pose a threat to her young. Dogs are an increasing danger to wild species across India. In Ladakh, they travel in packs and do not fear even large predators such as bears and leopards, and are a threat to the nests of Black-necked Cranes.

TOP *Past 10.30 p.m., a bear approaches construction debris near a temple in the vicinity of an army camp in Matayen. With their acute sense of smell, bears are easily drawn to the smell of food being cooked.*

RIGHT *Given the increasing proximity of bears, locals are being encouraged to predator-proof livestock corrals. Cases of human-wildlife conflict rise because bears are omnivorous and will readily prey on sheep and goats kept in unprotected corrals. Secure corrals help to reduce the risk of retaliatory killings.*

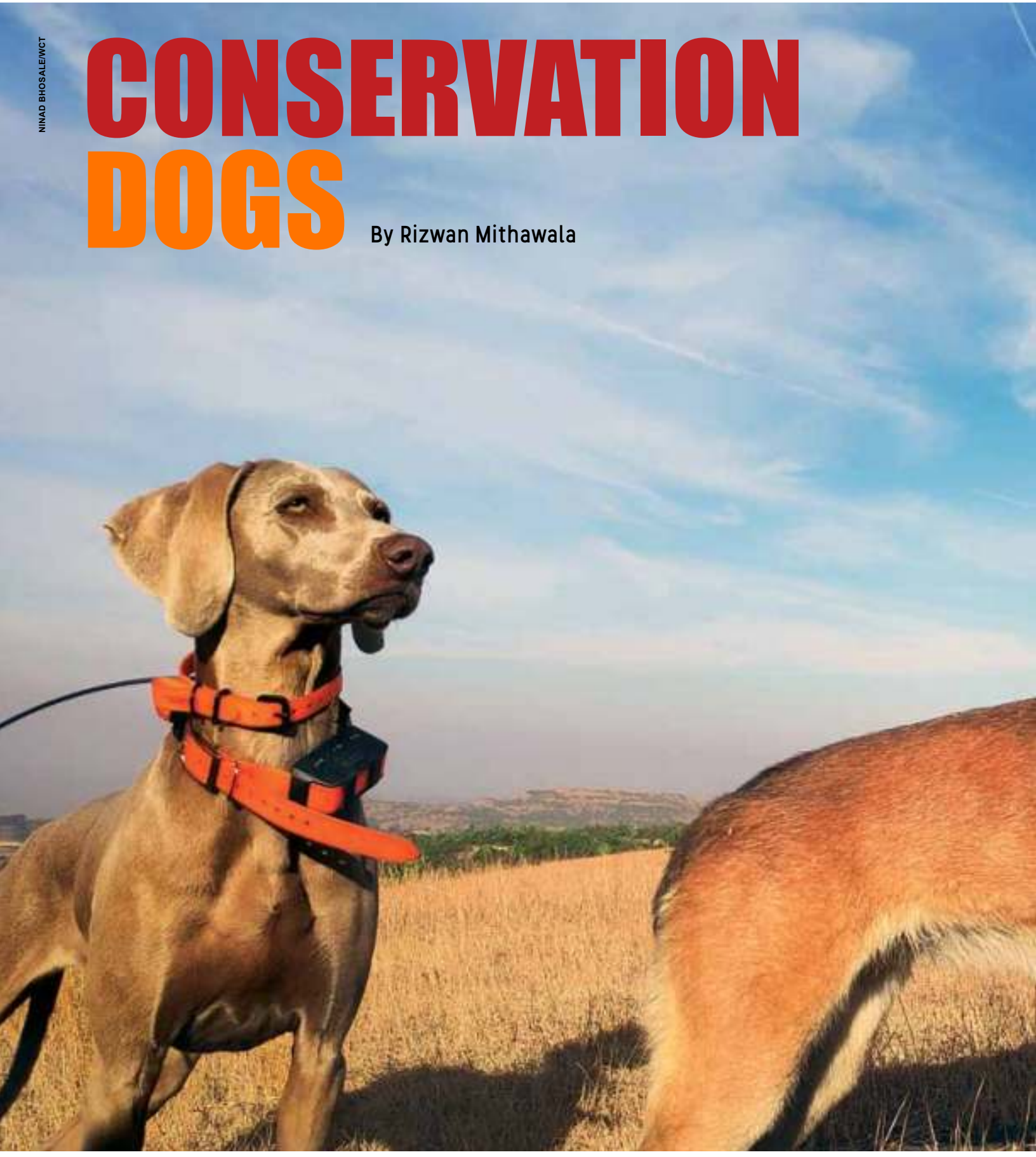
ABOVE *Himalayan brown bears normally hibernate until April-May. However, Drass bears have started becoming active as early as February, as observed by the photographer! Efficient waste management and free-ranging dog control are vital to the future of fringe bears.*

FACING PAGE *A mother helps her cub navigate sharp barbed wire spikes at an army camp in Bathra. The duo are regular visitors to the army camp. However, the innocuous search for food could inadvertently put their lives on the line.*

ABOVE *Another mother and cub pair give the photographer a quick glance in the early hours of the day before returning to their forest home after a night of scavenging. Using their olfactory sense, they were aware of the photographer's presence from afar.*

CONSERVATION DOGS

By Rizwan Mithawala



NINAD BHOSALE/WCT

In Late Stone Age Europe, 20,000 years ago, a teenage hunter is tossed over a cliff by a bison. He survives the fall, just fracturing his foot. On his way back home, he is attacked by a pack of wolves, but escapes death again by climbing a dead tree and injuring one of the wolves, which the pack leaves behind. He spares the wolf's life, and feeds and nurses the animal back to health. She follows him home, and gives birth to a litter of five pups. The wolf family becomes part of the tribe, which becomes the first to hunt with domesticated wolves.

The story is fictional, from the 2018 prehistorical adventure film 'Alpha', which speculates on the origins of the human-dog relationship. But the truth may not be less strange. Whichever domestication theory we choose to believe (there are more than one), the ancestors of modern dogs soon began to aid *Homo sapiens* on hunts. And that was when our destinies began to entwine.

We have come a long way since we first domesticated wolves. From the hunter-gatherers of the Stone Age, we have become a species that has single-handedly altered the Earth's environment. A force powerful enough to bring about change at a planetary level, we have brought in a new geological epoch – the Anthropocene. As we grapple with poaching, forest fragmentation, and other human activities that harm wildlife and ecosystems, once again, we turn to dogs to help, and we find them ready for the next command, ears raised.

Canine-aided conservation work is an emerging domain, and holds immense promise. I recently spoke to my colleague **Kiran Rahalkar**, who heads the Wildlife Conservation Trust's (WCT) Wildlife Law Enforcement Training Programme, and is also in-charge of WCT's Conservation Dogs Unit. The team comprising four working dogs and two men has been solving complex conservation problems for the past two years. Some excerpts follow.

Canine-aided conservation work is an emerging domain, and holds immense promise. These trained dogs can help monitor large landscapes, assess corridor connectivity, study animal movement and genetic diversity, and a lot more.

NINAD BHOSALE/WCT

ABOVE *The WCT team takes dogs on snare detection patrol in a multi-use area in the buffer zone of the Melghat Tiger Reserve.*

BELOW *A conservation dog indicates an active pangolin burrow.*

VIKRANT WANKHADE/WCT

Rizwan Mithawala (RM): What have the dogs been up to?

Kiran Rahalkar (KR): Our conservation dogs act as force multipliers and help different teams carry out their conservation interventions more efficiently. We humans 'look' for clues… dogs 'sniff' them out. They have helped in finding snares and traps, and also in tracking elusive species. This dog-human team also plays a crucial role in monitoring large landscapes and critical habitats.

RM: What goes into their training?

KR: Training is foundational, and we train them in such a manner that they are ever ready to face challenging field conditions. The handler and dogs work as a cohesive unit. The handler cares for the dog's day-to-day needs and provides the mental stimulus required to perform the given tasks. Some trainings – such as wild animal scent detection – are imparted in controlled environments, others on location, in the field.

RM: We know that dogs love action-oriented commands. How do you keep them in good shape, physically and mentally, when they are not deployed in the field?

KR: Drills are practiced regularly. One of them, cone detection, involves a specific scent added to one out of the several cones laid out. The dog must hone in on the cone with the target scent, which could, for instance, be carnivore urine, or excreta. They are also trained to identify biological articles related to wildlife, such as skin, blood and bones, hidden in a detection wall. These exercises sharpen their olfactory and detection skills. They also practice tracking and trailing humans and animals, and vehicular searches, in simulated settings.

RM: How are they rested if they must be in the field for days on end?

KR: Yes, we have faced the problem of dog accommodation at project sites, where assignments may last weeks. We modified a vehicle into a mobile kennel that can accommodate four dogs. It is well-ventilated with exhaust fans, and also equipped with temperature sensors and a surveillance camera. The vehicle also provides speedy, convenient transit during and between deployments across vastly different landscapes.

RM: Tell me about their unique role in Road Ecology surveys.

KR: Roads and other linear infrastructures typically cut across large landscapes which often have varying degrees of animal abundance. Conservation dogs help us

BHUPESH PATIL

gather data on the presence and movement of wild animals, especially large carnivores. WCT is the first organisation in India to deploy conservation dogs for road ecology surveys. Our dogs have worked along the National Highway 44 (NH-44, earlier called NH-7) that cuts through the important Kanha-Pench Corridor, as well as the Harda-Betul Road that bisects the Melghat-Satpura corridor. The insights from such surveys guide WCT in recommending the construction of mitigation structures on critical wildlife crossing hotspots along these roads.

RM: How do dogs help tackle the menace of snares?

KR: Snares deployed by subsistence hunters and professional poachers are well-camouflaged and difficult to detect. But dogs can sniff them out. Our dogs are deployed in the buffer zones of tiger reserves and along corridors, which are more prone to the menace of snares. We have deployed our dogs in the buffer zone of the Melghat Tiger Reserve, and are planning to extend the programme to PAs in Madhya Pradesh and Vidarbha.

RM: Recently, they have been trained to detect the presence of pangolins. How can they help in protecting these endangered animals?

KR: Yes! WCT is working on the behaviour and ecology of the Indian pangolin in the Central Indian Landscape, with the Madhya Pradesh Forest Department. Pangolins are shy, cryptic, elusive and nocturnal, taking refuge in underground burrows during the day. This makes them difficult to spot. Our dogs were deployed in the Satpura and Pench Tiger Reserves, and have proved helpful in tracking pangolin burrows, scat and feeding locations.

RM: How else do you think dogs can help conservation?

KR: With human-wildlife interactions on the rise, the chances of conflict-like situations are high, particularly when wild carnivores enter human-dominated environments. Conservation dogs help to track such animals in ways that humans cannot. This aids in tranquilising the animal, which can be returned to the wild, greatly reducing chances of harm to both humans and the animal that finds itself in such an unwelcome situation.

Rizwan Mithawala is a Conservation Writer with the Wildlife Conservation Trust and a Fellow of the International League of Conservation Writers.

ABOVE *Conservation dogs ready to track a leopard that had entered a human-dominated landscape.*

BELOW *Regular practice of vehicle search keeps the dogs ready to detect wildlife contraband, arms and ammunition, and traps and tools used in hunting.*

COURTESY: WCT

KARMA SONAM

Arid Zone Flora

Protecting the unique, high-altitude vegetation of Ladakh

By Phuntsog Dolma

I have always marvelled at the diverse flora of Ladakh and its ability to thrive in such harsh conditions. Ladakh is a unique, fragile high-altitude cold desert in the rain shadow region of the Himalaya. Though the landscape may seem barren to the untrained eye, Ladakh's arid ecology supports a flourishing diversity of flora, fauna and avifauna. For millennia, the region has remained an isolated, self-reliant ecosystem, thriving along with its people, whose traditions, festivals, folklores and unique agro-economy continue to be supported by its glacio-fluvial sediments. Human communities prosper here because of the inter-connectedness between themselves and with their surroundings. Centuries of knowledge, passed down from generation to generation enables them to thrive on high-altitude native edible plants, for food and medicine. Some species of flora, such as several *Artemesia* sp., are globally recognised for their proven role in traditional medicine.

DORJEY KONCHOK

DORJEY KONCHOK

KARMA SONAM

TOP LEFT *This woolly catmint* Nepeta floccosa *manages to take sustenance on a rocky slope near a valley in Ladakh. The author recollects collecting wild plants as a child, including this beautiful purple herb (left), locally known as* shalmagok.

TOP RIGHT *The Flinders rose* Capparis spinosa *bears fleshy leaves and striking, large pinkish-white flowers used in local dishes such as* kabra-tsotma.

ABOVE RIGHT *The roots of the spiked rhubarb* Rheum spiciforme *are used as a laxative. Centuries of knowledge passed through generations enabled Ladakhis to thrive on high-altitude, native, edible plants, for food and medicine. Today young people have much less knowledge and appreciation of this heritage and this must change if they are to survive the coming climate crisis that will hit Ladakh harder than most other places in the world.*

But in the past few decades, Ladakhis have had to deal with changes in their environment. Rain is more frequent, as is erosion. The implications of these fluctuations on floral diversity remain understated. As a Ladakhi I feel a vital need to share the significance of and the vulnerability of our highly under-studied flora.

RICH… AND VULNERABLE

A decade-long study published in 2020 listed over 1,085 species of flowering plants. Over a thousand of these are herbs, with the rest constituting trees, shrubs and climbers. I had learned from my grandparents the value of many intriguing plants (see box on page 86).

In the past decade, I have witnessed far too many changes that are transforming Ladakh's ecology and plant diversity. The major threats to vegetation include unrestricted uprooting and overexploitation for food, fuel, fodder and medicine. Herbalists often indulge in the unsystematic collection of medicinal plants and end up uprooting entire plants including *Saussurea lappa, Dactylorhiza hatagirea, Aconitum violaceum, A. heterophyllum* and *Podophyllum hexandrum.*

A decade-long study published in 2020 listed over 1,085 species of flowering plants in Ladakh. Over a thousand of these are herbs, with the rest constituting trees, shrubs and climbers.

KARMA SONAM

ABOVE Rheum spiciforme*, or* lachu*, is green when young (see image on previous page), but turns reddish-brown on maturity. The fleshy leaves and stems of this robust perennial herb are eaten both raw, or cooked. The plant grows in the Himalaya from Afghanistan to Tibet and J&K.*

Habitat destruction for the construction of roads, buildings and military settlements compound the over-exploitation of plants in local rituals and customs. And, when combined with the adverse impacts of climate change, virtually all Ladakhi plants are in trouble. During *Losar*, the local new year, the leaves of the juniper plant are collected in huge quantities to replace old juniper leaves on *Lha-thos*, a sacred abode of gods and goddesses.

Tourism is the lifeline of many Ladakhi families, but the establishment of tourist camping sites and trek routes have left measurable, adverse impacts on plants. On top of this we have overgrazing of pastures that affects the growth and density of medicinal herbs and species of vegetation, vital to pasturelands upon which humans and their livestock depend.

PROTECTING A VULNERABLE LAND Clearly conservation measures are called for, but before that we need to explore and document the plant diversity in Ladakh. Many botanists, mostly foreigners, have worked on the taxonomy of the region's flora. Ironically, however, the local populace, especially the young, have very little knowledge of this heritage. Given the importance of involving local communities in conservation, the challenges we face can best be tackled by making them aware of their incredible natural history, and to train them on plant identification and further exploration. This would create in the youth of Ladakh a sense of ownership towards the vulnerable habitats that sustain them. While floral species estimates are already astounding, the actual number could be much higher, but this will only be established when systematic and robust taxonomy-based botanical surveys are conducted.

Dr. Konchok Dorjey, professor of botany at EJM College, suggests two ways forward. For in-situ conservation, he recommends the identification of plants and the declaration of plant-diversity hotspots as Protected Area for Plant

The Plant Heritage of Ladakh

Though the international conservation community has a vague idea of Ladakh being a rich repository of medicinal flora, its diversity remains untapped. A study published in the *Journal of Ethnopharmacology* as early as in 2007 noted that no less than 68 species of plants found in the region are used by *Amchis* (local herbalists) in treatment against kidney and urinary disorders.

My grandmother collected zatsot *Urtica hyperborea* and kabra *Capparis spinosa* to prepare dishes like *thukpa* and *kabra-tsotma*. My friends and I would often collect various wild, edible plants like shalmagok *Nepeta floccosa*, khi-khol-ma *Taraxacum officinalis*, shangsho *Lepidium latifolium*, tsotse *Allium carolinianum,* lachu *Rheum spiciforme*, shrolomarpo *Rhodiola tibetica*, shroloserpo *Rhodiola imbricate*, kosnyot *Carum carvi*, phololing *Mentha longifolia*, and toma *Potentilla anserina*. Some members of the community burn and inhale *Ephedra gerardiana* as its ashes serve as a psychoactive drug.

Walnuts *(starga)* in Ladakh

"When I was much younger, I don't remember why, my friend and I thought that rubbing the green husk of walnuts on our teeth would make them brighter. So we sneaked some into school, and we rubbed them on our teeth during class time. Our mouth, our hands and our faces turned a dark greenish brown. We both were the jokers of the class that day. We were scolded and slapped by our class teacher. After that incident, I never tried that experiment again. But I have since learned many other uses of walnuts.

"The walnut husk, as you might have guessed, has a very strong colour. It was commonly used to dye traditional Ladakhi clothes. The thin papery brown layer around the walnut seed is rich in antioxidants. I haven't seen it, but my father told me that they used to boil it and make tea with it. Carpenters commonly use the wood from walnut, apple, and apricot trees to make kitchen utensils, especially ladles.

"Walnuts are great in food too. Walnut oil is an excellent substitute for butter. Walnut and apricot seeds are mixed in with roasted barley or wheat grains and eaten as a snack. Walnuts are also used to make pasta sauce and chutney. Birds love walnut seeds too. Magpies pick them from the trees and hide them in the ground. In October, when we harvest potatoes, we find a lot of walnuts hidden in the earth.

"In older times, walnuts were grown mainly in the Sham area. People from Sham would bring them to Leh *bazaar* and barter walnuts and apricots for pashmina and other things."

- Sonam Angmo, Likir.

via Nyiska (Stories from Ladakh)

The Reproduction Game

Influenced by severe climatic conditions, high-altitude plants in Ladakh have evolved a cycle, which encourages flowering, fruiting and seed-dispersal in a short span, before the short and favourable 'growing' season is over. Although seed production is a regular business, the most dominating plant species (*Saxifraga, Gentiana, Crassula* and *Sedum*) exhibit vegetative propagation, or what is called asexual reproduction. Here flowers or seeds are not involved in the multiplication process. Rather, it takes place through the formation of bulbils, bulbs, corms, tubers or stolons. However, through vegetative process, the dominance of any species is usually localised. This is because vegetatively propagated species have limited modes of effective dispersal. The plants, which reproduce sexually, or through seeds, on the other hand, have much wider ranges and are usually scattered over great areas. This happens because seeds can travel to far flung areas, carried by the air and water or those ancient partners, insects and birds.

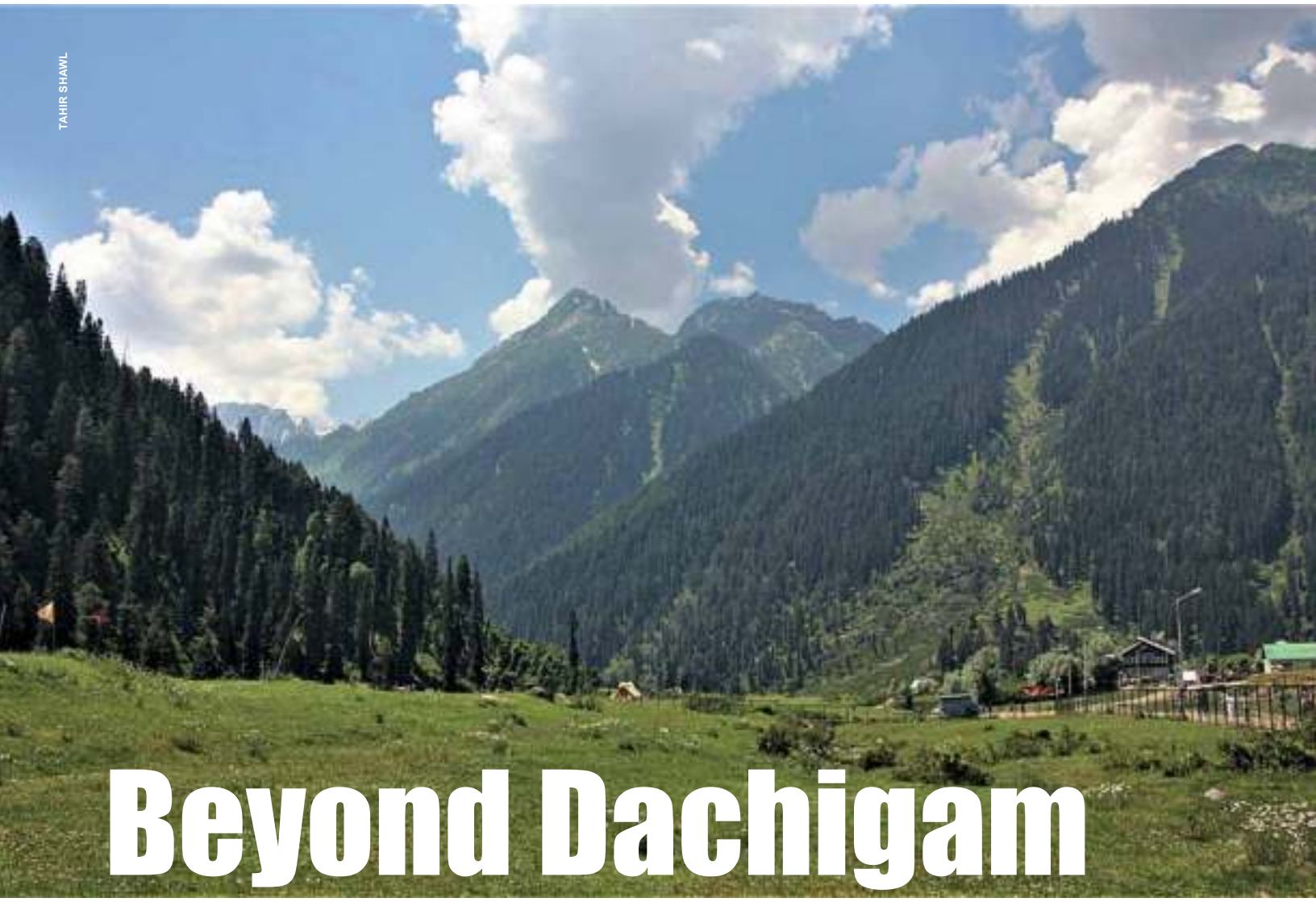
Colour too is of utmost importance as bright hues attract insects, bees and birds. Flamboyant red, yellow, blue and violet flowers are thus common at higher altitudes. Irrespective of their size, many plants of the cold desert put considerable energy into the production of the largest possible flowers. Species such as *Gentiana, Saxifraga, Companula* and *Anemone,* for instance, bear flowers which are often larger than the plants themselves! Timing is also of the essence. *Crocus, Soldanella, Gentiana* and *Primula* are ready to flower even before the snow has completely melted, long before the leaves appear.

Equally interesting is the role of solar energy in the development and formation of ovules and pollen grains. Helioptric (sun-seeking) flowers (*Anemone, Ranunculus, Saxifraga*), for instance, are shaped like bowls or saucers, which have highly reflective inner surfaces on their petals, with carpels and many fuzzy stamens in the central region. Like small dish antennae these focus reflected light and heat inward. Here the stamens and carpels soak up the heat, which stimulates the quick development of pollen and seeds. Even more fascinating, the mini-hot house within the blooms actually aids in pollination! If you remember just how cold it is in Ladakh, it will be easy to understand why insects are motivated to visit such flowers. Not only are they able to feed on nectar, but they also take the opportunity to absorb heat from the greenhouse-like conditions within the flower. In this manner the pollinators can increase their body temperature, sometimes by as much as 30^{0}C higher than the surrounds! The acquired heat obviously enhances their metabolic activity, including reproduction. Thus, through heat donation, the plants need put out comparatively less nectar to lure pollinators. They are thus able to conserve energy even as their symbolic relationship with pollinators is strengthened. Additionally, such flowers actually help the survival and reproduction process of the visiting creatures as well.

Excerpt from Ladakh: The Enigmatic World of Cold Desert Plants by Dr. H.J. Chowdhery and Dev Raj Agarwal, ***Sanctuary Asia*****, Vol. XI No. 4, July/August 1991**

Conservation (PAPC). He also advises the declaration of woodland areas, including wild juniper forests of Ladakh as Protected Juniper Forests (PJF). Infusing educational institutes and local communities with practical knowledge on ecology and natural history would, in his view, bolster conservation morale and build deep-rooted awareness. For ex-situ conservation, he suggested the establishment of a botanical garden and a 'Ladakh Plant Conservation Committee'. Collaborative initiatives between research institutes, government agencies and non-profits cannot be compromised on, if efficient conservation strategies are to be employed.

Howsoever such initiatives take shape, clearly conservation success will only be ours when individuals in all communities are aware of, engaged in and a part of the conservation of the unique, arid ecosystem that has evolved over eons in the cold deserts of Ladakh.



TAHIR SHAWL

Beyond Dachigam

By Divya Kilikar

A look at efforts to secure Kashmir's protected landscape beyond the widely loved Dachigam National Park.

Wild Jammu and Kashmir (J&K) is majestic, yet fragile. Unexplored, yet far from untouched. This part of the lesser Himalaya has been little traversed, with barely-there trails meandering precariously across glacial ridges and towering snow-capped mountains. Its gentler wild is well-worn by visitors from across the world – glimmering lakes, rolling hills, lush alpine woods and sprawling valleys. While the world is smitten with the widely varying wilds J&K has to offer, a high volume of Protected Areas remains threatened by human disturbance, or apathy.

PAs such as the wetlands of Pampore (see page 102) and Dachigam National Park (*Sanctuary Asia* Vol. 32, No. 2, April 2012) are relatively well studied, while others are neglected and often encroached. There are large gaps in our knowledge, documentation, understanding and protection of Kashmir's wilds. The 2,190 sq. km. Kishtwar National Park, comprising high-altitude evergreen and deciduous forests, offers the adventurous some of the most challenging (and rewarding) treks. This is where the snow leopard, brown bear, Western Tragopan and Himalayan Snowcock are to be found and yet, next to no long-term studies, or conservation efforts have been implemented.

What follows is a quick glance into conservation efforts beyond J&K's best-known habitat.

Western Tragopan
Tragopan melanocephalus

JAINY KURIAKOSE

TIMELY INTERVENTIONS

in Kazinag, Hirpora and Tatta Kuti

The Pir Panjal mountain range encompasses Kazinag National Park, Hirpora Wildlife Sanctuary and Tatta Kuti Wildlife Sanctuary. The Near Threatened markhor (see page 70), musk deer, Tibetan wolf, leopard and Himalayan black bear are among the charismatic species found here. Countless rain-fed streams, rivulets and rivers, originate here, and flow down to the valley, bringing freshwater to countless bogs, marshes and wetlands that support a diversity of wild species and the human communities that share their habitat. Naturalists caution, however, that sensitive attitudes and etiquette be maintained in these rich ecosystems. As in other parts of India, tourists have been known to indulge in off-roading, which severely damages root systems and soils.

Despite their isolation, the parks are threatened by overgrazing. In 2018, the Wildlife Trust of India (WTI) began working with the (then) state Forest Department, which had declared much of the PAs as no-grazing zones, establishing four teams to monitor and patrol the parks. Sameer Khazir of WTI points out that the traditional practices of migratory herders were once sustainable, but the *Gujjar* and *Bakarwal* communities traditions have changed and now land use patterns have begun to cause habitat degradation in Hirpora. Such impacts of 'transhumance' on wild ungulate populations in Hirpora, and the future of herding practices are currently under study.

Work is also on to reduce the firewood dependence of fringe villages by offering cleaner and more efficient fuel available.

ABOVE *The Near Threatened (IUCN) Himalayan Griffon Vulture* Gyps himalayensis *is a large raptor of Himalayan mountains, valleys and steppes, and is usually seen solitary or in small flocks.*

FACING PAGE *A sweeping view of the emerald Aru valley. The Overa-Aru Wildlife Sanctuary is part of the catchment area of the Lidder river, a tributary of the Jhelum.*

Prior to the pandemic, LPG cylinders were distributed to 781 households across the Pir Panjal range. This eased pressure on the ecosystem, reduced disturbance, and helped improve community health, especially that of women who spent hours each day next to polluting *chulhas* on which meals were cooked.

CHALLENGING THE SYSTEM

in Baltal-Thajwas

An enchanting mix of evergreen forests, scrubland and alpine meadows can be seen in the Baltal-Thajwas Wildlife Sanctuary, tucked in the Zangskar mountain range of northwest Himalaya. Notified in the late 80s, the sanctuary, however, lacks a detailed assessment of wild populations and habitat evaluations. It does, however, support a diversity of flora and fauna, including the Himalayan black bear, brown bear, snow leopard, musk deer and Himalayan Griffon Vulture, ibex, Himalayan Monal and Snowcock. Visitors can experience the area by way of a short one-hour trek from Sonmarg to the Thajwas glacier, which feeds the Sind river and is Kashmir's second largest.

Until a few years ago, the fragile Baltal-Thajwas ecosystem was overwhelmed by unregulated tourism, with as many as 5,000 vehicles entering the sanctuary daily in summers. Nadeem Qadri, an environmental lawyer and Amicus Curiae for the High Court of Jammu and Kashmir, made a strong scientific case for the protection of the Protected Area. He pointed out that vehicular exhaust was adversely impacting the local climate, and added to the risks posed by climate change to the vulnerable Thajwas glacier. In 2017, he was appointed by the High Court of Jammu and Kashmir to assist on all forest-related matters in the sanctuary. Subsequently, off-roading was banned. Qadri reports: "The impact was magical and grey waters turned blue, thanks to the ban of vehicles in the sanctuary. The glacier has since been recorded to maintain far more volume, and wildlife, including brown bears, are returning to the area."

ABOVE *Alarmed that the Thajwas glacier in the Zangskar mountain range was receding at the rate of 3.33 m. per year, the High Court banned vehicular movement in the Baltal-Thajwas Wildlife Sanctuary. Since then, the glacier has been recorded to maintain far more volume.*


TAHIR SHAWL


SHIV KUMAR

ABOVE LEFT & RIGHT *The Kashmir musk deer* Moschus cupreus *(right), is found across the western Himalaya from central Nepal to Afghanistan. Baltal-Thajwas (left), north of Srinagar, is prime musk deer habitat.*

SECURING THE BUFFER

in Khrew, Khonmoh, Dara and Brein-Nishat

The 141 sq. km. Dachigam National Park is skirted by a host of pocket-sized conservation reserves designed to soften pressures in the immediate surrounds of this vital hangul habitat. The Wildlife Conservation Fund (WCF) runs its Hangul Conservation Project here, particularly in Dara, Brein-Nishat, Khrew and Khonmoh Conservation Reserves.

The WCF confirms that these reserves are frequented by migrating tribes with established grazing rights where their sheep, goats and horses are brought to graze in summer. Attempts are continually made to win the support of communities, but appeals often go unheeded. It will take sensitive policy decisions to work with local communities, for without their support these extension habitats for Dachigam could fast degrade. One option being explored is to reduce tourism pressures from the popular Dachigam National Park to these smaller, but equally stunning areas so that the herders who know the mountains like the backs of their hands are able to benefit from less intensive grazing, yet earn more revenue from low-impact, experiential tourism.

TRACKING RARE AVIFAUNA

in Limber and Lachipora

In northern Kashmir, conservationists strive to map and secure populations of a Vulnerable pheasant – the Western Tragopan. The males are charming, sporting bright crimson patches and creamy white spots and indulging in elaborate mating dances. The bird inhabits high-altitude temperate forests across J&K and Himachal Pradesh and has lovingly been christened many names – *daangeer* in Kashmir, and *phulgar* and (my personal favourite) *jujurana* or 'king of birds' in Himachal. This, despite the bird being extremely shy, generally silent and only frequenting undisturbed core habitat areas. Though few have actually sighted it in the wild, if you must see one, try your luck in the conifer forests and riverine scrubland of the Limber and Lachipora Wildlife Sanctuaries.


TAHIR SHAWL

A WTI study published in 2017 estimated a global population (the bird is also found in Pakistan) of 2,500 to 3,500, and discovered a previously unknown population of 60-80 individuals in Limber. WTI has been monitoring and protecting the bird in high potential sites across both PAs. WCF has worked to raise awareness among children and adults of *Bakarwal* and *Gujjar* settlements in both Limber and Lachipora and are known to set up traps to capture the bird. The team also patrols and demolishes traps in the buffer zone of the PAs. The pheasant is hunted for its plumage and is seriously threatened by urbanisation, but there may be light at the end of the tunnel – a captive breeding programme is underway at Sarahan, Himachal Pradesh, and conservationists, photographers, writers and filmmakers struck by the antics of this handsome avian continue to look for it in the wild and tell the world its story.

LEFT *Kazinag's natural wonders such as this stunning waterfall makes it a popular tourist destination. Naturalists caution, however, that sensitive attitudes and etiquette be maintained in these rich ecosystems.*

The Sálim Ali National Park

Until the late 90s, the Sálim Ali National Park was nine square kilometres of wetland on the outskirts of Srinagar that invited at least 70 species of birds. The park also harboured Himalayan black bears, musk deer, leopards, markhor and Kashmir's state animal, the hangul deer.

Together with the Dachigam National Park, this forested area formed the catchment of the Dagwan river, which supplies Srinagar with water and helps maintain the health of the Dal Lake. The park had been notified with great fanfare in the late 1980s, but unfortunately in 1998, Chief Minister Farooq Abdullah, approved a plan to build an 18-hole golf course in the national park. Overnight, the habitat was bulldozed, destroying over 10,000 trees. All the infrastructure intended for a captive breeding programme for snow leopards was demolished. Soon, tube wells and pump stations were set up, pesticides liberally used and, what was once a throbbing ecosystem was chiselled into a lifeless playground for the rich and famous. Local conservationists, including Mir Inayet Ullah, the Chief Wildlife Warden, tried his best to dissuade the powers that be… to no avail. By 2001, the golf course was built. The park, however, has never been denotified.

RANJITH KUMAR

THE LEGAL GAP

J&K's legal framework does not yet recognise the vitality of the link between tourism and conservation, a critical fault in the system, given the region's dependence on the former, and extreme vulnerability to climate change, anthropogenic pressures and thus intrinsically, biodiversity loss. "There is no actionable tourism policy in place or any directives on how it must be conducted within Protected Areas, which is shocking, given that about seven per cent of our GDP comes from tourism. For example, no conservation work has been done in Gulmarg," says Nadeem. The Gulmarg Wildlife Sanctuary in the Baramulla district has received next to no protection since its notification in the late 80s. Gulmarg is a popular skiing destination in winter and is equally popular with other tourists all year round. An expansive recreational ground sprawls smack in the middle of the Gulmarg meadow. Visitors stay at the large resort, play golf and take Gondola rides on cable cars that can transport 600 people every hour to and from the Kongdoori mountain. They offer scenic views of what looks like beautiful coniferous, evergreen forests that are in fact very degraded. Today it is hard to imagine that this area was once an undisturbed refuge for black and brown bears, leopards, musk deer, and avifauna like the Himalayan Monal and Snowcock.

ABOVE *Wild cherries, apricots, wild apples, grapes, walnuts, acorns and chestnuts constitute the main diet of the Himalayan black bear* Ursus thibetanus laniger.

J&K must recognise that people come to visit primarily because of the state's natural beauty. Also that such natural ecosystems are its safety net in an age of a galloping climate crisis. With intelligent planning and more discipline than is evident, it is possible to figuratively 'have our cake and eat it too', but only if we make it our mission to ensure that the protection of wild Kashmir becomes part and parcel of the development strategy of the state.

Divya Kilikar is a writer, editor and wildlife enthusiast who focuses on communicating the rationale behind conservation. She is Assistant Editor at *Sanctuary Asia*.

HIGH LEVEL CONFLICTS AND RESCUES

WILDLIFE SOS

A traumatic incident of a black bear being burned alive set a determined Kashmiri woman, **Aaliya Mir,** on a life-changing journey. She always loved academics and pursued a graduate degree in Science, another in Education and a postgraduate degree in Mathematics. Not satisfied, she obtained a diploma in Disaster Management with a specialisation in animal health and shares her passion and concern for wildlife with *Sanctuary Asia* readers.

Education has the power to change the world, and there is nothing I believe in more strongly. My journey started as an educator, imparting and emphasising the tenets of knowledge and how it can actually help us manage our wildlife better. But I never once imagined that I would one day work in wildlife rescue and conservation.

I grew up in Srinagar, Kashmir, nestled amongst stunning mountains and a breathtaking valley. This has always been home to me. We have had our fair share of problems, but Kashmir's strength lies in the ability of its people to bounce back time and again. The process is not always easy, but the results are always fruitful. What caught my attention was the steady rise of human-wildlife conflict in Jammu and Kashmir (J&K) and the growing intolerance towards wild animals.

I can recall incidents of human-animal conflict that were so barbaric that they still send a shiver down my spine. Especially a particular incident that changed my life, forever. I was in Delhi in the winter of 2006 when I heard about a shocking incident in the Tral region in Kashmir. A female Himalayan black bear had unknowingly ventured into human habitation, and was clearly just as confused as the residents. People gathered around the bear and chased the defenseless animal with sticks, spears and axes, and pelted it with stones, even as it climbed a tree to save itself from the ambush. Then ultimately, the villagers set the bear on fire and dragged her through the streets. Visuals of the incident were shown over national media. I was furious, hurt and helpless. Determined to make a change, I joined Wildlife SOS, an animal rescue organisation.

MY TRYST WITH WSOS

In 2002, I started out as a volunteer in Delhi, and joined them full-time in Kashmir in 2007. I currently head their conservation programme in J&K as the Project Manager and Education Officer. From the very start, rescue operations became part of my life and work, especially where situations involved bears and reptiles.

J&K is home to the Himalayan brown bear (see page 74) and Himalayan black bear – two of the largest bear species found in the Indian subcontinent. Unfortunately, both animals find themselves between a rock and a hard place because their natural homes are being degraded and human settlements are coming closer to where they once lived in relative solitude. Predictably, cases of conflict are mounting, not just with bears but with leopards, porcupines, snakes and more recently, wolves, wild pigs and more.

The solutions are self-evident and most would end up improving the lives of both humans and animals. Clearly habitat protection and regeneration is one critical first step. This would not only ease conflicts, but also help tackle the conjoined issues that require climate mitigation, flood control and droughts, which were once virtually unheard of in the Happy Valley.

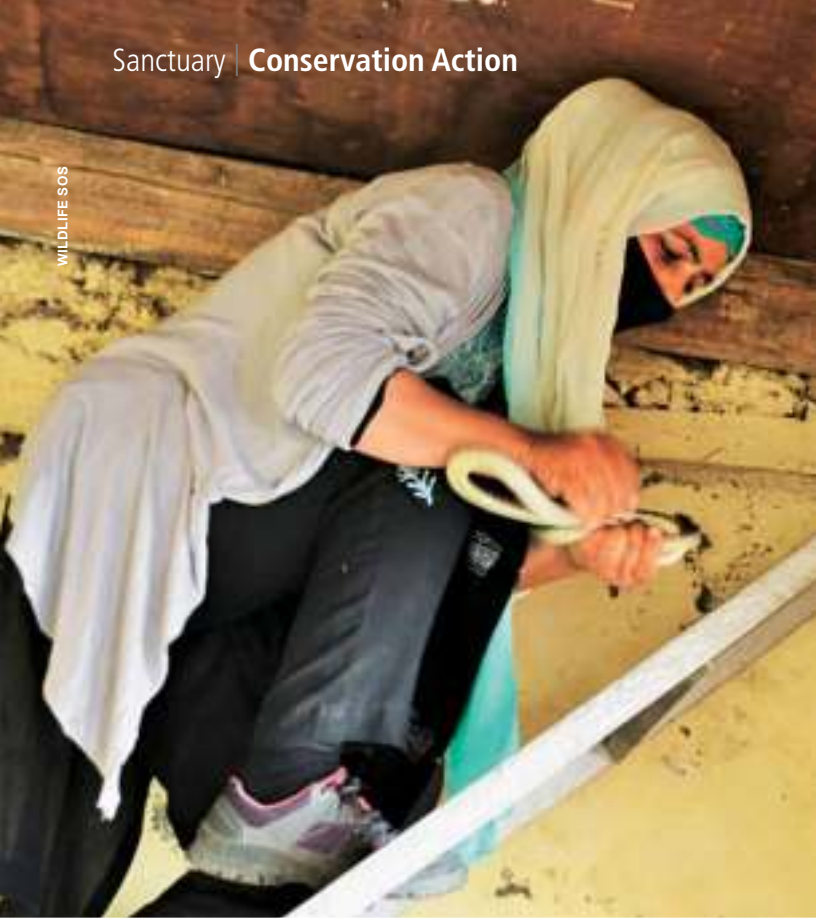
Only healthy ecosystems can ensure that wild species are able to access enough

LEFT *In addition to wildlife rescues, Aaliya actively works with the community to engage with the wilderness, including conducting birding tours in the Dachigam National Park.*

RIGHT *Aaliya feeding a rescued Himalayan black bear* Ursus thibetanus laniger*, a species often in conflict with humans. Climate change and loss of habitat has altered the bear's hibernation patterns, pushing it into negative encounters with people more often.*

FACING PAGE *A nature educator, the author introduces children to the ways of the wilderness through guided walks. In a landscape rife with conflict, both inter-human and human-wildlife, Aaliya Mir's determined and compassionate work as Project Manager and Education Officer of the J&K Wildlife SOS team provides hope for wildlife… and conflict resolution. Here she is seen with a rescued Egyptian Vulture* Neophron percnopterus*, an Endangered species.*

I consider myself lucky to be a part of the Wildlife SOS community-outreach programme. I lead a team that works from the heart to win the confidence of communities.



TOP AND ABOVE LEFT *A significant number of rescue calls Aaliya receives are related to snakes. Here, she is seen retrieving a Himalayan trinket snake* Orthriophis hodgsonii *from the rafters of the Lalit Palace Hotel, Srinagar.*

TOP RIGHT *Aaliya participating in the Asian Waterbird Census 2021 at Wular lake, an annual citizen-science event held between January and March. This is an integral part of the International Waterbird Census (IWC).*

ABOVE RIGHT *An educationist at heart, Aaliya believes that encouraging compassion and familiarity for wild species in their backyard will greatly empower and sensitise children, thus reducing current and future conflicts.*

food and shelter, so that they are not forced to enter human habitation. Not coincidentally, working to restore ecological balance to J&K's wilds would also boost downstream health, create jobs for women and men and encourage young Kashmiris to become the guardians of their own natural heritage. Such welcome change would inspire local communities to become the stalwarts of conservation and promote co-existence between humans and wildlife, to the advantage of both.

THE ONUS LIES ON US

Humans have no option but to adapt to wild nature and this involves behaviour and attitude changes. For instance, a vital conservation measure required in and around wilderness habitats is the disposal of waste. When organic waste is dumped in the open, all manner of animals would automatically be drawn to the food source. And since bears have a sense of smell that is 2,000 times stronger than humans, this amounts to a virtual invitation for them to arrive at our doorsteps from miles away.

As an education officer, my job entails sitting with communities, often women and children, to ensure that every individual is fully aware of the impacts of careless waste disposal. This is not by any measure an easy task as it requires patience and hard work. But every conflict situation avoided makes the effort more than worthwhile and very rewarding, because most wildlife rescue crises arise because of errors in human conduct, not animal culpability.

As might be imagined, mine was never an easy job. The nature of the task on hand is tough for both men and women, but for women there are additional liabilities. When in the field, I have often been belittled by people who did not believe that I was up to the job. While I focused on the rescue, I had to ignore the stage whispers that predicted failure of the task at hand. I never took this personally and as time went by, and communities living in known conflict areas began to see me handle animals effectively, they began to respect me and my work. Today, my team is rapidly gaining recognition by both locals and the enforcement agencies, without whose trust and support no real rescue work is possible.

This is why I believe from my core that changing local community attitudes is the most difficult and most rewarding aspect of my work, because it ends up saving the animals I was born to protect. Equally, it demonstrates to the young people watching the process, that they too can be part of the solutions. And that is a very key objective of my life's purpose. At this point, I do not even want to mention the difficulties in coping with Kashmir's often-hostile weather, difficult terrain… and our often-fragile political situation.

FINDING ONE'S CALLING

I love everything about my job. But I must confess a successful rescue and the smiling faces of communities whose problems are solved, make me the happiest. As is the case across the subcontinent, a significant number of rescue calls involve snakes! I have loved snakes for as long as I can remember and my fascination for reptiles only deepened with every effective rescue. My first-ever snake rescue took place in 2014, when we received a call from a residence in Makhdhoom Sahib. An eastern cliff racer had taken refuge in a house and the residents had come across our newly established helpline number. Subsequently, we received a call from a lodge about a trinket snake and yet another about a Levantine viper from a home in Rajbagh. I discovered that few people had any clue about the nature of the creatures we were rescuing. So, informing and familiarising them with the wild creatures next to which they lived was tantamount to empowering them.

But there are no shortcuts. I remember rescuing two Himalayan black bear cubs from a large tree trunk, after their mother had been driven away by locals who had set the tree on fire. By the time we reached, we discovered she had been forced to leave behind two newborn cubs whose eyes had not yet opened. We made great effort to reunite the little ones with their mother, but to no avail. Eventually we hand-raised the orphaned cubs, who will never live in the wild again. On another occasion, a leopard was seen roaming on the street, in the heart of Bagh-E-Mehtab in densely populated Srinagar. We always work closely with the J&K Wildlife Protection Department and this time the operation took five full days for our 20-member team to capture and safely release the cat back into the wild. That we had to deal with heavy snowfall added to our problems at one level, but also helped us track the cat by following its pugmarks and scats.

I consider myself lucky to be a part of the Wildlife SOS community outreach programme. I lead a team that works from the heart to win the confidence of communities. Our mission is to use awareness about wildlife to enhance the tolerance of people towards their wild heritage and thus reduce the frequency and intensity of human-wildlife conflict situations. Our team is ever-ready to respond to rescue calls involving large mammals like bears and leopards, and smaller ones like reptiles, raptors, turtles and even small birds. We also manage the rescue and rehabilitation facility in Dachigam and Pahalgam, where Himalayan black and brown bears are currently incarcerated.

We are single-minded in our purpose. Through workshops and community meetings we stress that humans must seek to learn more about wild animals and their natural behaviour and less to do with 'training' them to adapt to our ways. If we give them the space and isolation they need, more than half our job is done.

For me even a microbe has a purpose. Nothing is useless. Clearly, I have found my calling.

Aaliya Mir heads the conservation programme for Wildlife SOS in Jammu and Kashmir. She is the Project Manager and Education Officer for the Dachigam and Pahalgam Bear Rescue Centres. She is also Wildlife SOS' only female rescuer, and attends to distress calls for reptiles, birds and mammals caught in urban conflict. Aaliya firmly believes that education is the first step to mitigating conflict between humans and wildlife.

I believe from my core that changing local community attitudes is the most difficult and most rewarding aspect of my work, because it ends up saving the animals I was born to protect.

THE MUD ON BOOTS PROJECT

June 2021

Camera Trap Training

In Arunachal, Mud on Boots Project Leaders Dechin Pema Saingmo and Pemba Tsering Romo are working toward the long-term conservation of snow leopard and other high-altitude wildlife in the Mago-chu Valley.

In March, the duo helped conduct training sessions on camera trapping methods and analysis in anticipation of a statewide snow leopard (and other wildlife species) population estimation. Conducted in the Namdapha National Park, Miao district, Pasighat in the East Siang district and Dirang in the West Kameng district, the 'skill share' was attended by over 50 participants including forest guards, field biologists, research officers and Range Forest Officers from eight Forest Divisions. The sessions included interactions with participants to gauge perceptions toward landscape conservation, mammalian diversity, human presence, and threats. The purpose of such initiatives is to build capacity and exchange knowledge.

DECHIN PEMA

In March 2021, Project Leaders Dechin Pema Saingmo and Pemba Tserin helped conduct training sessions on camera trapping methods and analysis.

Championing Rewilding

Despite the surge in COVID-19 cases this year, Project Leader Vishal Ahuja continued his fieldwork in Chamba, Himachal Pradesh, while following all safety guidelines. Over the past two months, Vishal visited the Bhandal, Mayarigla, Kariyan and Haripur nurseries to collect information on native plant species availability. He also had one-on-one meetings with several organisations in the region, to invite participation in restoring degraded forest habitat. Territorial Divisional Forest Officer and Assistant Conservator (wildlife), were met with to seek support for conducting rewilding workshops for locals and Forest Department staff, and to provide local sapling species for habitat restoration. His interactions with the Director of the Rural Community and Development Centre, Gajnui, has laid the ground for future engagements with local communities and self-help groups. Vishal also interacted with and won the participation of the local Khajinag Mandir Committee, and several local farm owners willing to be a part of such restoration drives.

VISHAL AHUJA

Project Leader Vishal Ahuja is building awareness on rewilding by planting native plants.

Mapping Pastures, Predators and Prey

Project Leader Phuntsog Dolma believes that wildlife conservation can only be successful if there is active participation from local communities. While working with Ladakh's sheep husbandry department, Phuntsog witnessed both livestock depredation by wild carnivores, and pasture degradation by livestock in the Rong valley.

Phuntsog initiated surveys in Rong and created pasture maps with help from villagers who learned rudimentary mapping techniques. She undertook daily field visits to meet with livestock owners to identify suitable pastures near villages. She created hand-drawn village maps highlighting pasture locations, and included physical and political features such as hills, streams, track routes, highways, roads, and houses for two of the valley villages. She also helped villagers create indices for pastures, document altitudes, GPS locations and note down seasonal uses. Such documentation will offer detailed information on pastures to breeders, researchers and policy makers. The resultant database will be refined over time and will be critical to pasture management and wildlife conservation in the Rong valley. This is probably the first effort of its kind to create a participatory map of pastures in Ladakh, and Phuntsog's efforts were acknowledged and appreciated by the Forest Department, which has now requested her to create maps for all the villages in the Rong valley.

In April, Phuntsog also attended a training programme on the use of GIS for pasture mapping conducted by the Nature Conservation Foundation in Ladakh. She hopes to use GIS technology to understand past, present and future status of pasture areas and diversity and species richness of medicinal and fodder plant species.

PHUNTSOG DOLMA

Phuntsog Dolma initiated surveys in Rong and created pasture maps with the help of villagers.

Agriculture and Electric Fences

This year, the Panijhora village in the Jalpaiguri district of West Bengal experienced the return of migrant labourers because of the pandemic. This led to greater agricultural activity in the village and an increase in the use of live electric wires, to protect crops from wild elephants. As many as 12 elephants were electrocuted over the last two months. To deter residents and farmers from using these live wires, Project Leader Amir Chhetri and The Coexistence Project team jointly plan to distribute leaflets and hold public engagement sessions in selected villages and tea estates in the Jalpaiguri district. The leaflets focus on the legal repercussions of using live wires and propose alternative crop protection methods. Working in collaboration with the West Bengal Forest Department, more such initiatives are on the anvil.

PRIYANKA DAS

Amir Chhetri is working to build solar fences to mitigate human-elephant conflict in Panijhora village in West Bengal.

Wildlife Rescue & Patrol

In Pokhran, Rajasthan, Project Leader Radheshyam Bishnoi continues his daily patrols to monitor the habitat of the critically endangered Great Indian Bustard (GIB). Over the past two months, he and associate volunteers have patrolled and monitored the eastern side of the GIB Arc, which includes Dholiya, Gangaram ki Dhani, Khetolai, Loharki, Chacha, Odhoniya, Bhadariya, Laathi, Mawa, Ramdewra, Khara, Didhu and Ajasar.

Radheshyam coordinates Anti-poaching and GIB monitoring work of ERDS Foundation and their network of community volunteers in the eastern side of the GIB Arc area. His consistent work in protecting the wilds has earned him the respect of the *Bishnoi* community, famed for their traditional and religious values that revere all wildlife. Villagers inevitably report wilderness-related mishaps to Radheshyam, who then informs the Rajasthan Forest Department. He recently rescued a chinkara injured in a road accident near Bhadariya and another that had been attacked by feral dogs. Dedicated to a fault, he also rescued a Tawny Eagle injured by high tension electric powerlines, and an injured Himalayan Griffon and Cinereous Vulture.

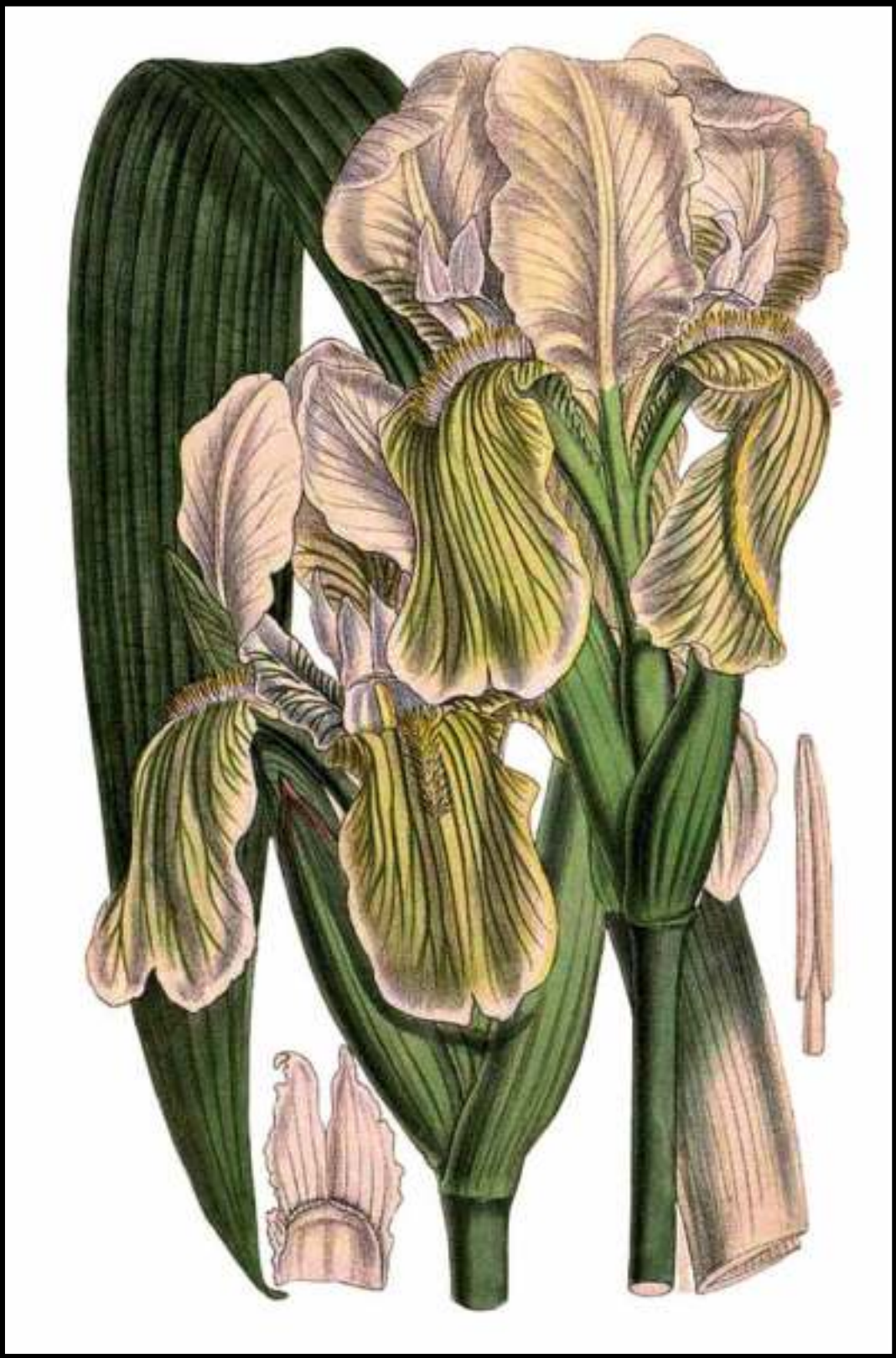
SHYAM BISHNOI

Radheshyam releases a rescued chinkara after rehabilitation.

Conservation 101

On April 19, 2021, conservation policy specialist and spatial analyst, Nandini Mehrotra of the conservation enterprise Technology for Wildlife addressed Sanctuary's Mud on Boots Leaders on the use of GIS and geospatial data analysis and technology in conservation. During this Zoom session, project leaders discussed ways to strengthen their conservation work using technology and GIS systems.

PUBLIC DOMAIN / MATILDA SMITH



Endemic to J&K, the Kashmir iris *Iris kashmiriana* grows at altitudes of 1,500-1,800 masl. Traditionally, planted around graveyards, locals call it *mazaarmond* (*mazaar*, meaning graveyard and *mond*, meaning thick root), a reference to its rhizomatous root. This illustration by Matilda Smith embodies the flower's beauty – its elegant cream petals (some can be light blue, white, lavender or bluish purple) sport yellow-tipped 'hairs' down the middle of the outer sepals. Flowering between April and May, the blooms are fragrant and exquisite and in colonial times, the British carried them home and replanted them in the Royal Botanic Gardens in Kew. Poisonous when ingested, the plant is used in traditional medicine as an external application for eczema, rheumatism and for some livestock diseases.

The Sanctuary Papers

JAMMU, KASHMIR AND LADAKH EDITION

By Abinaya Kalyanasundaram

WINTER HEROES

In the cold desert of Ladakh lives the pika. Resembling a mouse, but closer to rabbits, this tailless little rodent-like creature does not hibernate in winter. Of the 28 to 32 species worldwide, five are known to exist in India, all in Ladakh. Some use burrows in meadows and others use crevices of the *talus* (rocky patches). The largest is the Ladakh pika *Ochotona ladacensis*, weighing over 200 g. Even when deep snow blankets the landscape, the diurnal pika is active, often enjoying soaking in sunlight in late afternoons. Its fur grows thicker as winter approaches. It has also evolved a process called non-shivering thermogenesis to survive the bitter cold and turns its white adipose tissue to brown, to increase body temperature and aid metabolism. How does it find food with all the grass and plants buried under snow? An expert food-gatherer, it collects grasses and plants that will be sun-dried and then stockpiled in summer, ready to be gorged on in winter.

PUBLIC DOMAIN / WIKIWAND

THE LEGEND OF MUSK

PUBLIC DOMAIN

In the mystical world of perfumery, the discovery of one scent back around 3,500 B.C. in China and India grabbed humans by the nose. Musk had a unique, distinctive fragrance, and quickly became every perfumer's dream. Even today it is the base scent for many perfumes in the world. Universal and versatile though its scent may be, the way it is sourced is not quite pleasant. Sourcing of musk often involves killing the male deer (see page 53) for its caudal glands, obtained by trapping the deer from the wild. The glands are dried and the resultant black granular 'musk grain', is infused with alcohol. Musk deer are not true deer (cervids), in that they do not possess antlers, but sport small tusk-like canine teeth. They dwell in the forested and scrub mountain habitats across the Himalaya. Seven species are known to exist including the Kashmir musk deer *Moschus cupreus*. During the rutting season, males secrete the musk to attract females, and it is this scent that has led them to become victims of human exploitation. Highly prized, musk has been traded using the silk route in ancient times and is still unfortunately used in traditional medicine for its alleged stimulation and sedative properties. Synthetic alternatives exist and musk deer trade has been banned by the Convention on the International Trade in Endangered Species, or CITES, since 1979.

Did You Know?

In 2020, a 13-million-year-old fossil was discovered in the Udhampur district of Jammu and Kashmir, which was identified as a new ape species Kapi ramnagarensis*, the earliest ancestor of the modern-day gibbon.*

PUBLIC DOMAIN / C.VERNUS WULF

WORLD'S COSTLIEST STIGMA

The saffron crocus *Crocus sativus* may seem like any other beautiful flowering plant, but within its cup-shaped lilac petals, it holds a treasure coveted for its unique essence around the world – saffron. Saffron has long been considered the world's costliest spice. The perennial herb is used for flavouring and colouring culinary dishes and in medicinal and pharmaceutical industries. India produces about seven per cent of the world's saffron (Iran takes the top spot with 88 per cent), all of which is grown exclusively in Jammu and Kashmir, majorly Pampore village, 14 km. from Srinagar. Kashmir saffron, in particular, has a high crocin content and rich aroma, making it a premium variety, more than that of Spain and Iran. Just one kilogramme costs about Rs. 2,50,000! The extremely high cost seems justifiable considering the enormously labour-intensive process. *Crocus sativus* grows in Kashmir's well drained *karewa* soil, at elevations of about 1,500-2,000 masl. It needs extreme heat and dryness in summer and extreme cold during winter, and blooms only in the autumn months of October. The flowers have to be hand-picked and the red stigmas separated one by one, then carefully toasted dry on a charcoal fire. Over 1,50,000 flowers are thus picked and processed to produce just one kilogramme of saffron!

> Conservationists now ask that, as with the Sheep Farm, the trout hatchery also be shifted out of Dachigam.

TROUT TALES

Two trout species are found in Kashmir – the rainbow trout *Salmo irideus* and brown trout *Salmo fario*. Interestingly, neither are native species, both having been introduced by anglers into the valley's waterways a century ago by the British, from Northern Europe. It all began when Maharaja Pratap Singh, in 1899, sent a gift of a Kashmir stag to the Duke of Bedford, who courteously sent back 10,000 trout eggs as a token of gratitude. All perished enroute the long ship journey, but a second shipment, of 1,800 brown trout fry from Scotland in 1900 survived and reached Bombay aboard the P & O liner 'Caledonia'. From here they were transported to a hatchery at Panchgam, where the Dachigam National Park now exists. Over the next few years, trout continued to be introduced in streams across the Kashmir valley and in 1912, rainbow trout joined the fray. Exotic species are a major threat to local flora and fauna and it is anyone's guess what the impact of this introduced species has on local fish species. Conservationists now ask that, as with the Sheep Farm, the trout hatchery also be shifted out of Dachigam.

PUBLIC DOMAIN

PUBLIC DOMAIN

Did You Know?

Toad-headed agamas Phrynocephalus theobaldi*, are so named for their unique head shape, that has a fringe of projecting scaly eyelids around their eye slits. These form an effective barrier against sand. Found at altitudes that range between 3,600 to 5,100 masl, these lizards live at the upper limit of any reptile in the world.*

OF TERRITORIES AND SYMBOLS


PUBLIC DOMAIN

Every state and union territory of India has its own symbolic tree, animal, bird and flower. The essence of this practice is to spur prideful conservation of the species to ensure its future survival. The Union Territories of Jammu and Kashmir, and Ladakh, however, are now faced with a strange dilemma. Prior to the *Jammu and Kashmir State Reorganisation Act*, 2019, the erstwhile J&K state animal was the hangul *Cervus hanglu hanglu* and state bird the Black-necked Crane *Grus nigricollis*. However, the bifurcations of the state into two Union Territories created a problem. The hangul exists only in J&K's Dachigam National Park, while the Black-necked Crane is only found in Eastern Ladakh. J&K is now looking for a flagship bird – the Kashmir Flycatcher *Ficedula subrubra*, a small rare bird that breeds in Kashmir, is a strong contender. Considering that state animals and birds usually receive conservation priority, this could help save the vulnerable bird from extinction. As for Ladakh's symbol animal, no strong contenders have been identified as of yet, though the snow leopard is likely to be the animal of choice.

{ Bearded Vultures almost exclusively depend on bones, which can be digested by their strong gastric juices. }

BARE BONES

The Bearded Vulture or Lammergeier *Gypaetus barbatus*, is a resident avian, present in Himalayan habitats of J&K and Ladakh. It sports reddish-yellow and white feathers on its head and chest, while its wings and tail are an intense greyish black. Relatively small-headed, it has a thick neck and characteristic bristles below the beak giving the impression of a beard. Its most unique trait, however, is its feeding habits.

It almost exclusively depends on bones, which can be digested by its strong gastric juices. The marrow that it gets to is also a highly nutritious source of energy. This is the world's only species known to do so. This has caused the species to evolve differently from other vultures in that it is not 'bald' since it does not have blood and gore sticking to its head feathers. The Lammergeier forages over massive ranges, which may extend across 700 sq. km. in a day. It uses thermals to soar effortlessly in flight. When food is found, the bird strips the carcasses of bones, flies to considerable heights and drops the bones, sometimes repeatedly, until they shatter to expose the marrow within. The evolutionary advantage of its diet is the lack of competition for the food upon which it depends!

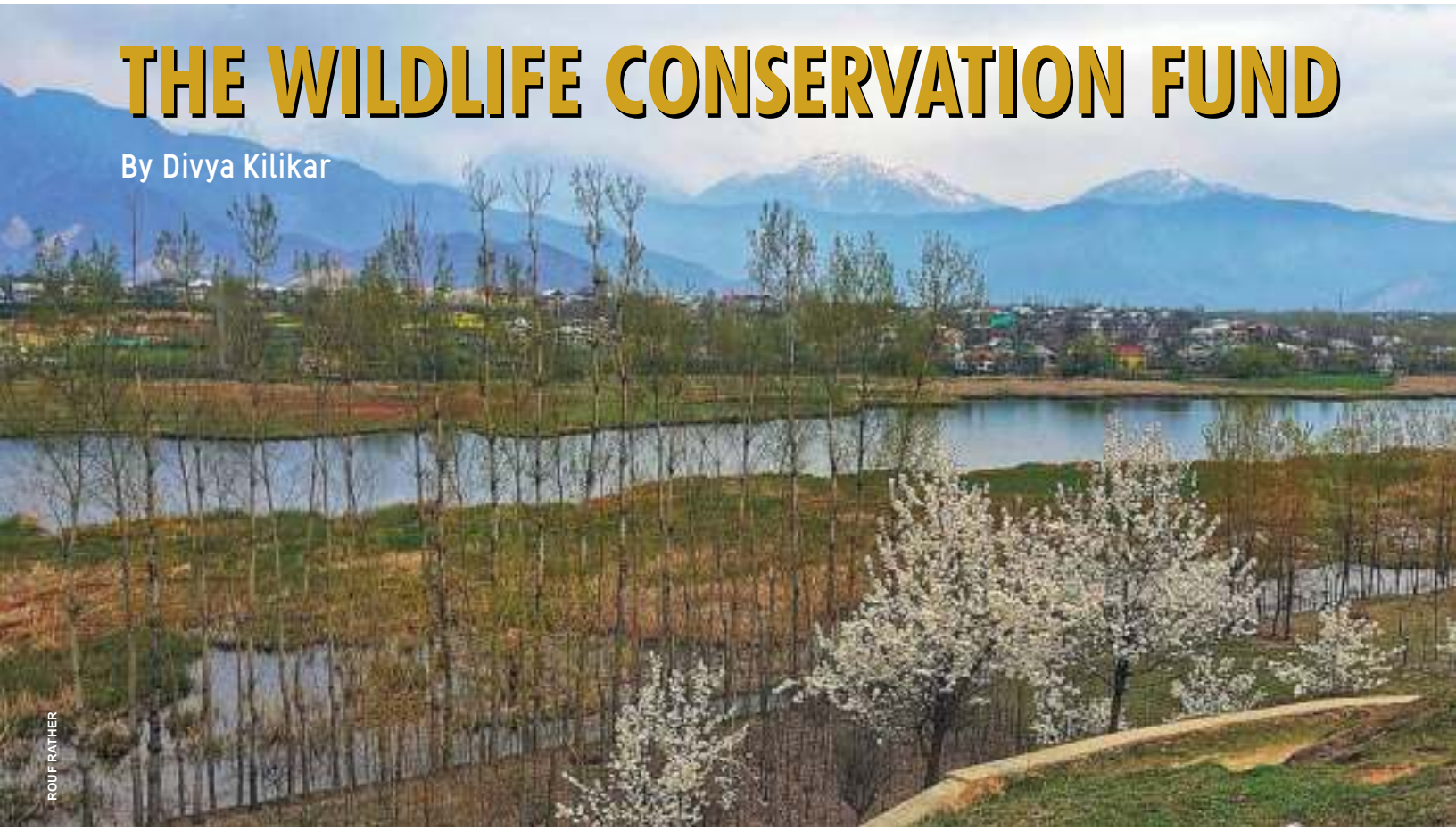

PUBLIC DOMAIN / W.WELLCOME

Did You Know?

Himalayan marmots Marmota himalayana *live in the alpine grasslands of Ladakh in colonies. They construct a vast underground network of burrows, sometimes 10 m. deep, where they hibernate together during winter. To avoid detection by predators and for hygiene purposes, they create latrine chambers inside their burrows!*

THE WILDLIFE CONSERVATION FUND

By Divya Kilikar



ROUF RATHER

Tucked between Jammu and Kashmir's frosted peaks, beside sprawling valleys and blocks of human settlement, lie one of the most threatened ecosystems in the Himalaya – wetlands. The union territory is blessed with over 3,000 of these stunning, jewel-like, nutrient-rich freshwater bodies, a majority of which are just under three hectares in size. And yet, each of these wetlands is part of a life-giving biome that provides for the needs of millions of people and wildlife, and then some.

The Wildlife Conservation Fund (WCF) was founded in 2010 by Nadeem Qadri, environmental lawyer and currently Executive Director at WCF, to educate people about the many roles these high-altitude carbon sinks serve, and specifically to motivate the local community to protect the wetlands of Pampore in South Kashmir. The organisation comprises individuals from varying professions including science, business and law. "We are united by our drive to make a change, and we've been learning on the job for over a decade now. "Much of our work involves pushing for legal and policy changes more than actual conservation science," says Aamir Wali, who joined WCF as a volunteer in 2017, and currently serves as its CEO. Over the years, WCF broadened its horizons and now works to strengthen protection for the hangul deer, black bear, snow leopard and other species, primarily through awareness programmes, human-wildlife conflict mitigation, health camps, community initiatives, policy suggestions, on-ground patrolling, population assessments and more (see page 88, Beyond Dachigam).

J&K's life-giving wetlands have been under great ecological stress for decades. They are often treated as dumping grounds – unfiltered pollutants flow freely into the waters, and trash is unabashedly tossed into them. Nadeem grew up observing migratory waterbirds that frequent four wetlands in his hometown, Pampore – Fashkoori, Chatlam, Kranchu and Mainbug. Though protected by law as Wetland Reserves, the management of the waterbodies lay with the J&K Revenue Department. Nadeem began volunteering for wetland conservation at the age of 14, and continued lobbying for their protection when he became a lawyer.

In 2013, after conducting an assessment of 137 avian species of the Pampore wetlands, WCF prepared the first-ever independent species checklist of these and other wetlands in Kashmir. The wetlands were eventually handed over to the jurisdiction of the Wildlife Department, with WCF as their official, continuing conservation partner.

Encouragingly, while poaching continues unabated in some wetlands, not a single poaching case has since been recorded in Pampore, save for one bird that was seized outside the boundaries of the wetland reserve. The individual was immediately apprehended and sentenced to 15 days in the central jail.

Community awareness is integral to the mission, and addressed with consistent

focus. The Jammu and Kashmir Bird Festival and Asian Waterbird Census are important annual events on WCF's future calendar. The festival, on hold until the pandemic allows, will invite birdwatchers from across the country to exchange views and purpose through workshops, field visits, bird walks and round table discussions and webinars with colleagues across India.

The census is planned as a citizen-science initiative that will contribute to the larger International Waterbird Census, that would pool in observations and estimations on avian populations, assess wetland health efforts and the effectiveness of local conservation efforts. WCF also engages with community and forest and other state government officials on issues concerning wetland conservation, including anti-poaching strategies and community welfare.

One particularly significant success for WCF has been its ability to win support to secure the Khrew and Khonmoh Conservation Reserves, near the Dachigam National Park, a stronghold of the hangul. Around 20 of the endangered hangul deer were counted here. Nadeem continually emphasises the need to win the support of and create livelihoods for local communities by creating circumstances where their youth are able to benefit from biodiversity renewal in and around the periphery of the sanctuary. Towards this end, joint efforts with community representatives have paid off with a discernible reduction of pressure on the species.

From the time it was formed, with sheer persistence, WCF has worked with the authorities and community to incentivise the relocation of the sheep breeding farm in the Dachigam National Park, which has resulted in more security and food availability for all manner of species including black bears, leopards and, of course, the hangul deer. They are now helping to monitor human-wildlife interactions in and around the park.

In the past decade WCF has linked social awareness, public opinion, departmental cooperation and legal steps, and this has been a key reason for its success. Through the COVID-19 crisis, the organisation, with help from partners and supporters has been able to engage local herders to patrol the fragile landscapes around Dara and Dachigam and it is expected that with every passing day, the results of such dedication will show up in the shape and form of stabilised populations of the wild species that are in truth the real caretakers of wild Kashmir.

ABOVE *A pair of Bar-headed Geese in Pampore. In 2013, after conducting an assessment of 137 avian species of the Pampore wetlands, WCF prepared the first-ever independent species checklist of these and other wetlands in Kashmir.*

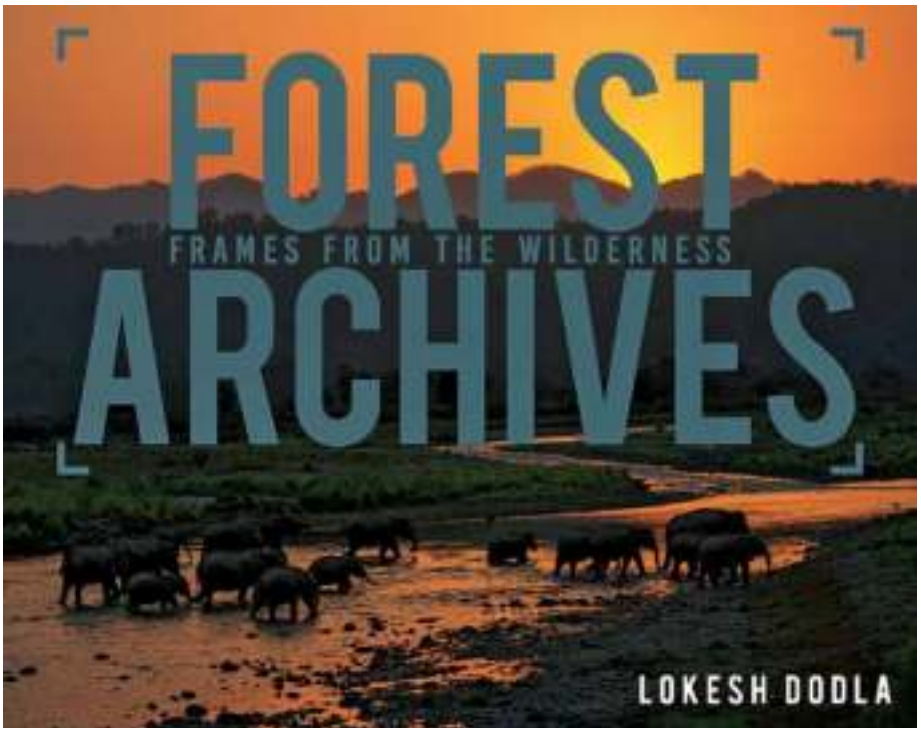
FACING PAGE *The Wildlife Conservation Fund was founded to educate people about the ecological role of high-altitude wetlands, and specifically to motivate the local community to protect the Pampore wetlands in South Kashmir.*

A Pit Stop on the Central Asian Flyway

The wetlands of J&K ensure the water security of several human communities and provide livelihoods through fisheries, farming and tourism. They are a major stop for waterbirds of numerous species that travel along the Central Asian Flyway (see pages 43 and 66) during their annual migration from breeding grounds in Siberia to diverse wintering grounds across Asia, including the Indian subcontinent, Maldives and the Middle East. The birds need staging grounds that are undisturbed. Healthy wetlands are well suited for this purpose as avians are able to rest, feed and gather strength before continuing on their arduous journeys. Several endangered species found in these wetlands include the Ferruginous Duck or White-eyed Pochard, Pallas' Fish-eagle, Black-bellied Tern and White-headed Duck. As of now WCF has documented 137 avians, but this number is sure to rise as time goes by. Resources, including bird specialists, naturalists and ornithologists from organisations such as the Bombay Natural History Society are invited to help protect birds and bird habitats across Jammu, Kashmir and Ladakh.

BOOK REVIEWS

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



FOREST FRAMES FROM THE WILDERNESS ARCHIVES

By Lokesh Dodla
Published by BlueRose Publishers
Hard cover, coffee table format,
164 pages, Rs. 2,199/-

A labour of love, the author-photographer provides us with snapshots of some of India's finest biodiversity vaults, together with pithy texts that offer insights into the natural history, flora and fauna and helpful hints on how to visit the havens he so transparently treasures.

The book covers eight wildlife haunts, some better known than others:

The Keoloadeo Ghana National Park at Bharatpur, Rajasthan, which was created 250 years ago as a hunting ground for the Maharaja of Bharatpur and his guests and is now an unparalleled bird sanctuary visited by thousands each year. This was a favourite haunt of Dr. Sálim Ali, the grand old man of Indian ornithology.

The Bandhavgarh Tiger Reserve, Umaria, Madhya Pradesh, once a hunting preserve of the royals of the Baghels who shifted their capital to Rewa. The well-protected wilderness sprawls across the Vindhyan Hills and is today one of the most popular wildlife destinations in India.

The National Chambal Sanctuary, located between three states of Rajasthan, Madhya Pradesh and Uttar Pradesh, is watered by the Chambal river, a waterway whose gharials and avian life draw visitors from across the globe. An arid landscape studded with low hills and deep ravines that were once the haunt of feared dacoits, this wilderness connects Ranthambhore Tiger Reserve to Palpur Kuno Wildlife Sanctuary.

Chiplun, Maharashtra, is a biodiversity jewel, which lies within a wilderness that nestles in ranges older than the Himalaya. For this chapter, the author has chosen to focus on kingfishers alone from among the region's rich forest and marine diversity. One of India's least-known Western Ghats biodiversity treasure vaults, it hosts 335 globally threatened species that cling to survival. The region receives 4,000 m. of rainfall, which is eight times India's national average.

The Corbett Tiger Reserve, Ramnagar, Uttarakhand, is India's oldest national park and the author lavishes much of his attention on this world famous landscape that is the pride of India. Justifiably called the land of Roar and Trumpet, the forest was named after the hunter-turned-conservationist Jim Corbett. This is where Project Tiger was launched in India.

Rann of Kutchh, Gujarat, is a treasure trove of endemic wildlife. This chapter focuses primarily on flamingos and other avians that thrive in the Thar Desert ecosystem that comprises grasslands, salt pans, coastal wetlands and marine waters. This region's several Protected Areas have species as diverse as flamingos, bustards, wild asses, desert foxes, blackbuck, chinkaras and some of the most elusive raptors to be found in India.

Sattal, near Bhimtal, Nainital District, Uttarakhand, is located in the Kumaon, lower Himalayan region. The area gets its name from the seven lakes that water this amazing wilderness, which has become a magnet for birdwatchers from across the globe who flock to experience the rare botanical, avian and mammalian life that abound in this incredibly rich ecosystem.

Tadoba, Chandrapur, Maharashtra, is the state's oldest national park and one of India's most popular tiger reserves. Studded with a mix of deciduous and bamboo forests, the Tadoba-Andhari Tiger Reserve was once a famous hunting block, but is now demonstrating how the water security of semi-arid regions can be boosted by allowing nature to regenerate through the interactions of plant and animal communities.

A FIELD GUIDE TO THE SPIDER GENERA OF INDIA

By Ayan Mondal, Debomay Chanda, Atul Vartak and Siddharth Kulkarni
Published by Ayan Mondal
Soft Cover, Small format,
408 pages, Rs. 3,000/-

Spiders appeared on Earth some 400 million years ago and are undoubtedly among the most successful, most adaptable lifeforms imaginable. With so many bird guides and mammal guides published in India, I always wondered when a good-to-honest spider guide would emerge. We now have one.

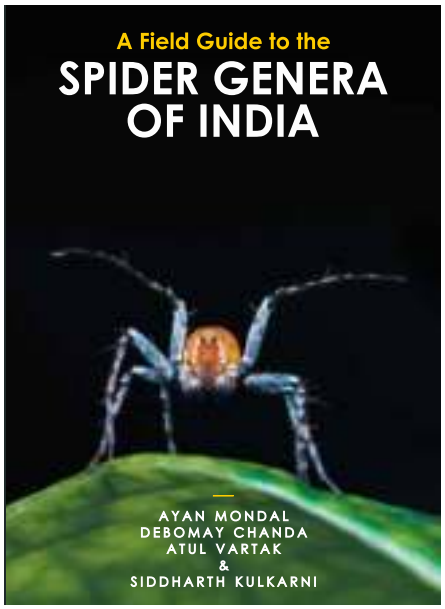
This incredibly detailed guide, a product of citizen science, includes an astounding 1,100 colour plates and illustrations, all meticulously identified, from 350 genera within 63 spider families.

The well-produced book was put together for serious arachnologists but will be a great boon to amateur naturalists too. I cannot imagine any library not keeping a couple of copies in their collection.

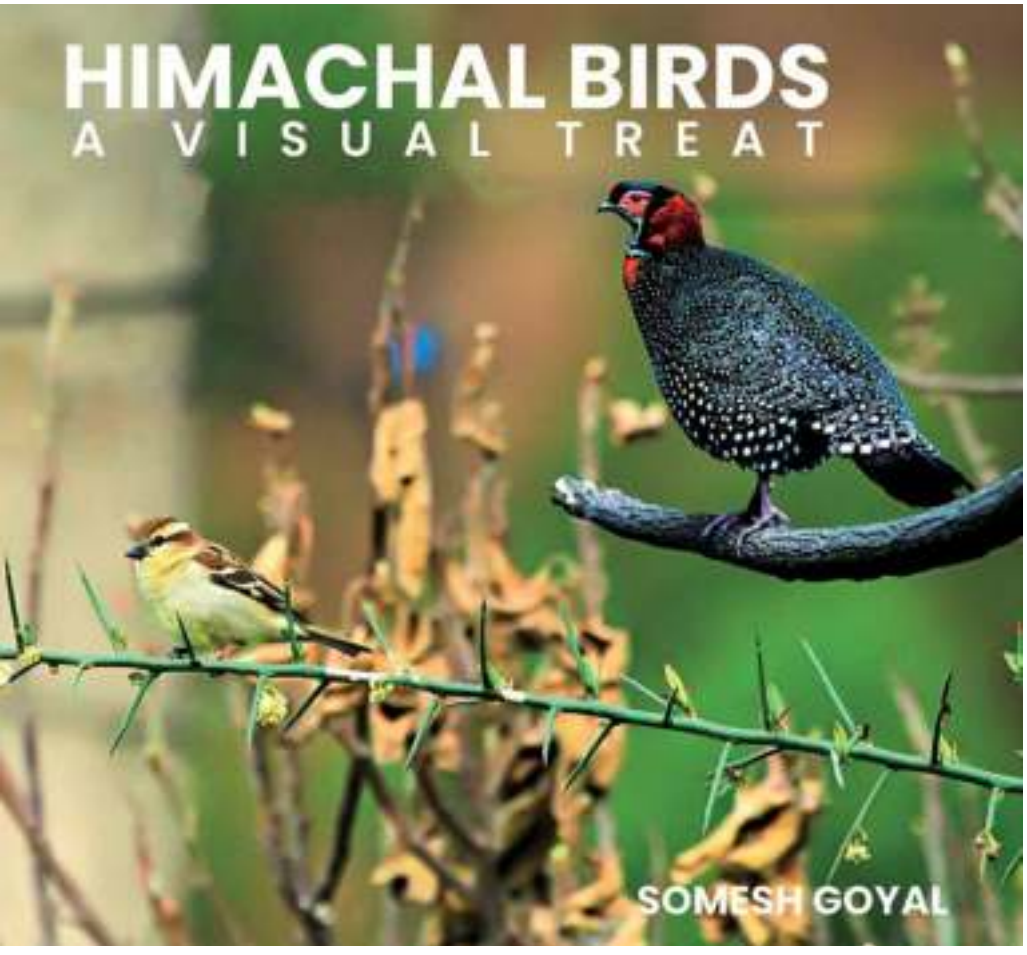
What amazed me was the way content and design combined to deliver a truly functional publication that informs us about the morphology of spiders, their evolutionary lineages and digestible information on the natural history of these incredible predators.

The authors manage to convey the magic of spiders as lifeforms that have the capacity to observe, learn and strategise. We know that spiders possess silk glands to construct webs, but few probably know that even those that do not craft webs use their silk to wrap and immobilise prey, some even to migrate long distances, using silken strands as sails to catch the wind. Some spiders prey primarily on other spiders, others manage to disguise themselves as ants... the list of their accomplishments is endless.

While so many people have an unreasoning fear of spiders, this book should trigger the fascination for life on Earth among the young. In my view, this is the best spider field guide thus far published in India and I strongly



recommend that all those interested in biodiversity and natural history find ways to buy or access a copy. And if you are an experienced or budding arachnologist... get your copy today!



HIMACHAL BIRDS

By Somesh Goyal
Published by IndiaClicked.com
Hard cover, coffee table format,
200 pages, Rs. 2,500/-

Somesh Goyal is a highly decorated Indian Police Service officer who has served in several vital national organisations including the Special Protection Groups and the National Security Guard. The book he has put together, however, has everything to do with his passion – birding and bird photography – which he followed through every posting he has held in places as far removed as Kashmir, West Bengal and Himachal Pradesh, where he was appointed as the Director General of Police (Prisons).

Himachal Birds is "A Visual Treat," to use his own words. Those who read this book will discover that Himachal Pradesh is a birding destination par excellence. As Cdr. Kanwaar B Singh writes in his Foreword: "To put the rich avian diversity of the state in perspective, over 50 per cent of all bird species seen in India have now also been reported from Himachal Pradesh."

Reviewed by Bittu Sahgal

DSP MUTUAL FUND & IndusInd Bank

PRESENT

THE SANCTUARY WILDLIFE AWARDS

Co-sponsor Greenko

The Sanctuary Wildlife Awards were instituted in the year 2001 to recognise and draw national attention to the contribution of individuals working for the protection of wildlife and natural habitats in India. We invite nominations and entries from Sanctuary readers, which should be sent to reach us no later than ***August 31, 2021*** *Send entries to: Sanctuary Wildlife Awards 2021, 145/146, Pragati Industrial Estate, N.M. Joshi Marg, Lower Parel., Mumbai 400 011 or email: admin@sanctuaryasia.com*

Lifetime Service Award

Criteria: An individual whose life has been devoted to the protection of wildlife species or their habitats on the Indian subcontinent.

We are in search of a true hero;
someone whose life's purpose and respect for nature can be held out as an inspiration to the youth of India.

Nomination Form

Lifetime Service Award

Name of candidate: _____

Sex: M/F Age: ____ Occupation: _____

Place of work: _____

Address: _____

_____

City: _____ State: _____ Pin: _____

Tel.: _____ Email: _____

Proposed by: _____

Occupation: _____

Address: _____

_____

City: _____ State: _____ Pin: _____

Tel.: _____ Email: _____

Signature: _____ Date: _____

Seconded by: _____

Occupation: _____

Address: _____

_____

City: _____ State: _____ Pin: _____

Tel.: _____ Email: _____

Signature: _____ Date: _____

What qualifies your candidate for the Award? (attach sheet)

Wildlife Service Award

Criteria: Individuals currently working in the field who have displayed extraordinary courage, dedication and determination in the arena of wildlife conservation.

We are in search of inspired wildlifers, forest employees, researchers, villagers or anyone currently involved in nature conservation in the field who have set personal standards for others to follow.

Nomination Form

Wildlife Service Award

Name of candidate: _____

Sex: M/F Age: ____ Occupation: _____

Place of work: _____

Address: _____

_____

City: _____ State: _____ Pin: _____

Tel.: _____ Email: _____

Proposed by: _____

Occupation: _____

Address: _____

_____

City: _____ State: _____ Pin: _____

Tel.: _____ Email: _____

Signature: _____ Date: _____

Seconded by: _____

Occupation: _____

Address: _____

_____

City: _____ State: _____ Pin: _____

Tel.: _____ Email: _____

Signature: _____ Date: _____

What qualifies your candidate for the Award? (attach sheet)

Guidelines: Nominations must be kept confi dential from the candidate. ● Nominations must be proposed and seconded by individuals/organisations who know the candidate well. ● A brief note (around 500 words) on the achievements that qualify the candidate for the award should be attached along with a biographical note (around 250 words) and photographs of the candidate at work. ● Details of specific instances/examples demonstrating the candidate's committment together with details of the issue he or she is tackling. ● Press clippings/published material, if any, by or about the candidate or the candidate's work may be included. ● Any other supporting material for the benefit of the judges may be included.

Green Teacher Award

Criteria: An individual currently working to communicate wildlife and conservation values to students in Indian schools or colleges.

We are in search of an individual with a missionary zeal who is setting an example for other teachers to follow. Creativity, leadership qualities and a proven track record of working with young persons in a rural or urban setting is imperative.

Green Teacher Award Nomination Form

Name of candidate: _____

Sex: M/F Age: _____ Occupation: _____ Place of work: _____

Address: _____

_____ Tel.: _____ Email: _____

Proposed by: _____ Occupation: _____

Address: _____

_____ Tel.: _____ Email: _____

Signature: _____ Date: _____ Seconded by: _____

Address: _____

_____ Tel.: _____ Email: _____

What qualifies your candidate for the Award? (attach sheet)

Guidelines for Green Teacher Award: Nominations must be proposed and seconded by individuals/organisations who know the candidate well. ● A brief note (around 500 words) on the achievements that qualify the candidate for the award should be attached along with a biographical note (around 250 words) and photographs of the candidate at work. ● Any other supporting material for the benefit of the judges.

Young Naturalist Award

Criteria: An individual between the age of 16 and 25 on August 31, 2021, who shows extraordinary caring and respect for nature.

We are in search of a young naturalist or conservationist, for whom the study and defence of nature is the purpose of life, whose actions speak louder than words and who inspires hope for the future.

Young Naturalist Award

Name: _____ Sex: M/F Age: _____

Occupation: _____ Address: _____

_____

_____ Tel.: _____ Email: _____

Proposed by: _____ Address: _____

_____ Tel.: _____ Email: _____

What qualifies your candidate for the Award? (attach sheet)

All awards are subject to the following conditions

The contest is open to everyone except Sanctuary Nature Foundation, DSP Investment Managers Pvt. Ltd., IndusInd Bank and Greenko employees or those directly associated with the organisation of the contest. The winners will be chosen by a panel of judges, appointed by the Sanctuary Nature Foundation, whose decision will be final. In the event that entries do not meet the judges' standards, the organisers reserve the right to refrain from making an award.

Sanctuary
NATURE FOUNDATION

SAVE HOKERSAR

Queen of Wetlands

NADEEM QADRI

The 1,375-ha. Hokersar wetland in Zainakote near Srinagar city, just 200 yards from the busy Srinagar-Baramulla highway, is one of four Ramsar sites in Jammu and Kashmir. Fed by two perennial streams, the Doodhganga and the Sukhnag, this wetland is located on the Jhelum river's floodplains and is flanked by freshwater marshes.

Bird ringing studies at the wetland have recorded at least 64 migratory and resident waterfowl species. Hokersar is part of the vital Central Asian Flyway and has great international significance. It is the winter home of migratory waterfowl from the Siberian tundra. Fondly known as the 'queen of wetlands', Hokersar hosted over half a million birds in its nutrient-rich waters in years past, including the Tundra Swan, Greater White-fronted Goose, Black-tailed Godwit, Golden Plover, Lesser Sand Plover, Kentish Plover (see bottom right), Little Stint, Ruff, Whimbrel, Spotted Redshanks, Northern Pintail (see bottom left) and Pied Avocet.

Today, this important avian refuge is under threat. Unscientific flood management plans have led to its degradation and destruction. As part of flood management for Srinagar, the Department of Irrigation and Flood Control, Kashmir allegedly violated environmental protocol and dredged deep into the Hokersar Wetland Conservation Reserve, causing severe damage.

Environmental lawyer Nadeem Qadri says: "The Chief Wildlife Warden, J&K, regretted that the conditions of the National Board for Wildlife, MoEF&CC, were violated during the dredging operations! This wetland is now almost completely dry (see above)."

The number of avians that visited the wetland saw an alarming decline in 2020-2021. While the exact numbers were difficult to estimate, wildlife officials who visited the area as recently as March 2021 reported that with something like 80 per cent of the excavated material still illegally lying in the wetland, it is no surprise that most avians gave this once-bountiful wetland paradise a miss.

Dr. Asad R. Rahmani, a Governing Council member of Wetlands International, South Asia, highlighted the lapses of the Irrigation and Flood Control Department in a letter to Honorable Manoj Sinha, Lieutenant Governor of J&K, writing that sluice gates at inlets and outlets to manage water retention and flow had not been installed. Instead, the department deepened the canals so far that the wetland was almost completely drained.

More mishandling of this fragile ecosystem is rife. The massive September 2014 floods had led to a rise in siltation levels, already adding to Hokersar's woes. The reserve is probably one of the very few Ramsar sites with no official conservation action plan.

Wetlands control floods, protect coastal zones, sequester and store carbon, and offer safe refuge to a diversity of avian and aquatic species. Wetlands also add greatly to the cultural and economic wealth of local communities. Young people in Kashmir ask that Hokersar be treated as a 'turn around' example by implementing the many well-thought out, science-based plans that lie ignored and in wait.

WHAT YOU CAN DO

1. Write to the Honorable Lt. Governor, politely expressing your concerns and support for the measures that could return health to Hokersar in short order by installing sluice gates.
2. Stress the importance of creating an official conservation action plan for Hokersar, focused on its eco-restoration. Email at rajbhawan-jk@nic.in or tweet to @manojsinha_.
3. Jammu and Kashmir Eco-Watch has launched a Save Hokersar Campaign. Follow their updates on Facebook.

ROUF RATHER

REYAN SOFI

Sanctuary

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YOGISH HOLLA

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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 a post about wildlife baiting for photography

Jitendra Singh
We know almost all the unethical practices used for wildlife photography. Question what's shown in a photo, imagine how the image was taken, what were the conditions?

Kenneth Lawrence
Wildlife photography is a privilege and not an entitlement! It's our conscious, moral duty as 'wildlife photographers' to ensure that mindsets are changed for the better.

On the article 'Rescuing Wildlife and Finding Hope in Wayanad'

COURTESY: NITHIN DIVAKAR

Shireen Sithara
We are glad to give our beloved Shantha *chechi* recognition through your media. Hoping to see more such 'Stories of Hope'.

On Sanctuary's April 2021 cover story 'Women in Herpetology'

Nandini Rajamani
A great read. The #MeToo movement never reached the ecology and conservation communities in India!

@dinz_in_lenz
This issue [Sanctuary Asia April 2021] has incredible articles including @herpomania and @crazy_chipkali's Women in Herpetology.

Response to the Sanctuary Impact Report 2020-2021

Nikkhil Advani
Proud to be associated with Bittu Sahgal and @SanctuaryAsia. What we pass on to the next generation is in our hands.

Responses to the #SavePanna campaign

@savedumna
The poacher who killed the last tiger did not know that it was the last. But the *sarkar* that kills the Panna forest knows, yet turns a blind eye. #padhelikhegawar #savepanna #pannabachao.

@mahesh_wildphotography
Glad that there are people who raise their voices for wildlife and biodiversity conservation when it matters the most. But poaching persists in Panna, and for that matter all other PAs. The death of tigers under mysterious circumstances is still being reported.

On an image of a tiger cub holding a discarded chips cover in its jaws

@crested.hawk.eagle
It's very sad... there has to be a proper environmental court, with the power to rule in favour of, or against, projects of this type.

@malakar_mithun
Irresponsible tourists and photographers! With every second person wanting to be on magazine covers, and more tourists visiting, there is bound to be a huge impact. Tourism is a lucrative business taking a big toll on the environment everywhere.

READERS' FORUM

COURTESY: DR. RACHUNLIU G. KAMEI

Responses to 'Women in Herpetology'

Ashwini V. Mohan and Sneha Dharwadkar's article highlights the many reasons why women are underrepresented in herpetology in India. Here's the first step in acknowledgement and awareness, leading to a better future for all HERpers!

Anuja Mittal, Mumbai

A much-needed article on gender roles, challenges and field work hurdles faced by brave women working in the critical field of herpetology.

Sarita Fernandes, Goa

They sampled 1,100+ Indian herp papers to prove that the disparity between men and women involvement in herpetology is real and found some more shocking results!

Anuj Shinde, Pune

My friends Sneha and Ashwini have landed the cover story in *Sanctuary Asia* magazine for their article on Indian women in herpetology! Featuring interviews, perceptions and stories from many HERpers! Fun fact: I got to know them because of the interview for this article and I am so excited for this community I've found! Also excited to read articles by Suneha Jagannathan and Yuvan Aves in this issue.

Anjana Parandhaman, Reno, Nevada, United States

Probably one of the best pieces I've read in *Sanctuary Asia*. It talks about the plight of women in STEM fields like herpetology and how it's important to recognise this in so many aspects.

Anushka Kawale, Mumbai

Responses to 'Where Art Meets Conservation'

BARKHA LOHIA

I was featured alongside some wonderful artists in this month's *Sanctuary Asia*. Thank you, Manini Bansal, for interviewing me.

Sahana Subramanian, Bengaluru

Sometimes art fills every part of you. Seeing Barkha Lohia's page reminds me of my childhood and reflects in so many ways what I've been trying to find for a long time.

Nikhil Sundar

The biggest difference between humans and nature is that nature never differentiates between its children on the scale of colour, size, or gender. Art is actually a branch of the tree called nature.

Sanjay Deshpande, Pune

Brilliant stuff, conveys everything in a single picture.

Sushant Jadhav

Responses to 'Close Call'

Whenever I enter Ranthambhore, I always worry about something similar to this kind of accident happening. Just imagine if it were a tiger in this case, instead of a leopard!

Jitendra Thakare

IN OUR NEXT ISSUE...

Pillibhit's Sugarcane Tigers

Keshav Agarwal writes about 'sugarcane tigers' that have made the sugarcane fields around the Amaria region, of Uttar Pradesh's Pilibhit Tiger Reserve their home. But as they stray close to human habitation and farmlands, both their lives and those of local communities are at risk.

Protecting Panje

Panje is a vast wetland expanse in the Uran Taluka of Raigad District, Maharashtra. The site is home to over 40,000 birds when tidewaters inundate the land. But this avian haven is

PINAKI PRASAD SINGH

The leopard is better at handling road rage than Delhi.

Ankush, Goa

Both the parties are safe and now the officials have also restricted entry of two wheelers on this route to minimise future conflict.

Official Ranthambhore Tourist Board

Thank you for this sad yet interesting and thought-provoking post. When we disregard nature's safety, we endanger ourselves.

Christina Fernandes, Goa

SUBRAT BEHERA / WTI

Responses to 'A Chorus, A Census and Other Antidotes To Pessimism'

If we can't count every victory, even if it is a continuous battle, then it's like saying only some things or big things matter. Give me optimism and hope, what else is there to live for, Pranav Capila?

Ishita Das

Our work with local communities to save gharials in the Gandak, is a story of conservation optimism. Get this and more at *Sanctuary Asia*.

Wildlife Trust of India, New Delhi

threatened by misguided notions of development, writes **Stalin Dayanand**.

The Grey Ghost

From the cold altitudes of the Hemis National Park in Ladakh to the upper reaches of Spiti valley in Himachal Pradesh, **Shreekanth Somany** spent years looking for and photographing the elusive snow leopard, and chronicles his adventures during this time.

The Many Colours of Gir

Deputy Conservator of Forests **Dr. Mohan Ram** documents the ever-changing canvas of the Gir National Park through the seasons, from goldening grass to the blooming of vibrant forest flowers.

Notes from our Writers: April 2021

Sneha Dharwadkar and I present a story that has been a result of one year of conversations. A story close to us and a story you must read. I'm curious to know how much you know about herpetology. Close your eyes and imagine a child catching a lizard, a researcher training people how to catch a snake and a professor studying crocodiles. Because when I began work in herpetology, I would have imagined a man! And that's because, study of herps has been (like all other fields) dominated by men. Sneha and I have discussed these factors with 18 other women in the field, and a few men, to understand their journeys and perceptions of some of these issues.

Ashwini V. Mohan, Bengaluru

The *Sanctuary Asia* April 2021 issue carries an article with images of the Indian Grey Hornbill taken near my home in Walkeshwar, Mumbai. It started with two individuals four years ago, today the number is 12 and counting. These birds have adapted well to their urban surroundings, but sometimes they pick up *ghatiya* and *rotis* instead of ficus fruits, insects and reptiles.

Darshan Khatau, Mumbai

My first published article is out on *Sanctuary Asia's* website now! I've written about my journey as a biologist into the monumental task of marine habitat restoration through artificial reefs – a developing field in India. For those who watched 'Seaspiracy' and noted the film's loud claims that "there is no such thing as sustainable fishing,"artificial reefs were pioneered by fishers across India for generations. Here's sustainable fisheries in action. Thanks to Umeed Mistry and Pushpak's photos, which give the article some life!

Suneha Jagannathan, Pondicherry

Towards the end of February 2021, I spent a week on an inflatable raft on the Gandak river. Ours was a four member team from the Gandak Gharial Recovery Project and we were tasked estimating the population of the critically endangered gharials. The project represents one tiny speck of hope, for here is a hitherto unpolluted, relatively undisturbed river with a steadily growing population of gharials, which are on the brink of extinction in the wild. In the April 2021 issue of *Sanctuary Asia*, I thrust my hand into the sunlight, trying to catch this and other glittering motes of conservation optimism.

Pranav Capila, Gurgaon

In the April issue of *Sanctuary Asia*, I have written a semi-autobiographical essay on walking out of mainstream schooling and my journey in reimagining education.

Yuvan Aves, Chennai

Errata: In *Sanctuary's* April 2021 article 'A Chorus, a Census and Other Antidotes to Pessimism', the photograph of a gharial with hatchlings on top of page 50 was wrongly credited to Pranav Capila. The image was taken by Santosh Jana. We regret the error. *Ed.*

DEBORSHEE GOGOI

SUNDERLAL BAHUGUNA

January 9, 1927 – May 21, 2021

Chipko Movement Leader

Sunderlal Bahuguna knew that a healthy biosphere was the most basic human right. He worshipped forests, which he always maintained were families of plants and animals, not just trees.

One of the prime builders of India's new environmental awakening, he lived in the Himalaya throughout his life and strived to protect the mountains he loved so deeply. His plea to the youth of today to safeguard the Himalaya, indeed our entire biosphere... is in truth the last word that should be spoken today.

Sanctuary Asia

MEET THE TEAM

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