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Big Cats

A magazine by IBCA on wildlife conservation

Special Op-Ed by
World Bank President
Ajay Banga
and former WB President
Robert B Zoellick

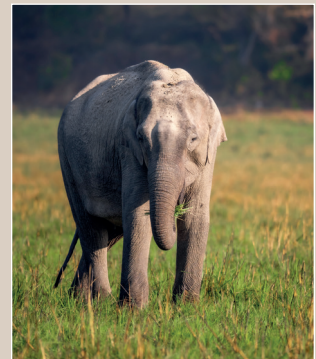
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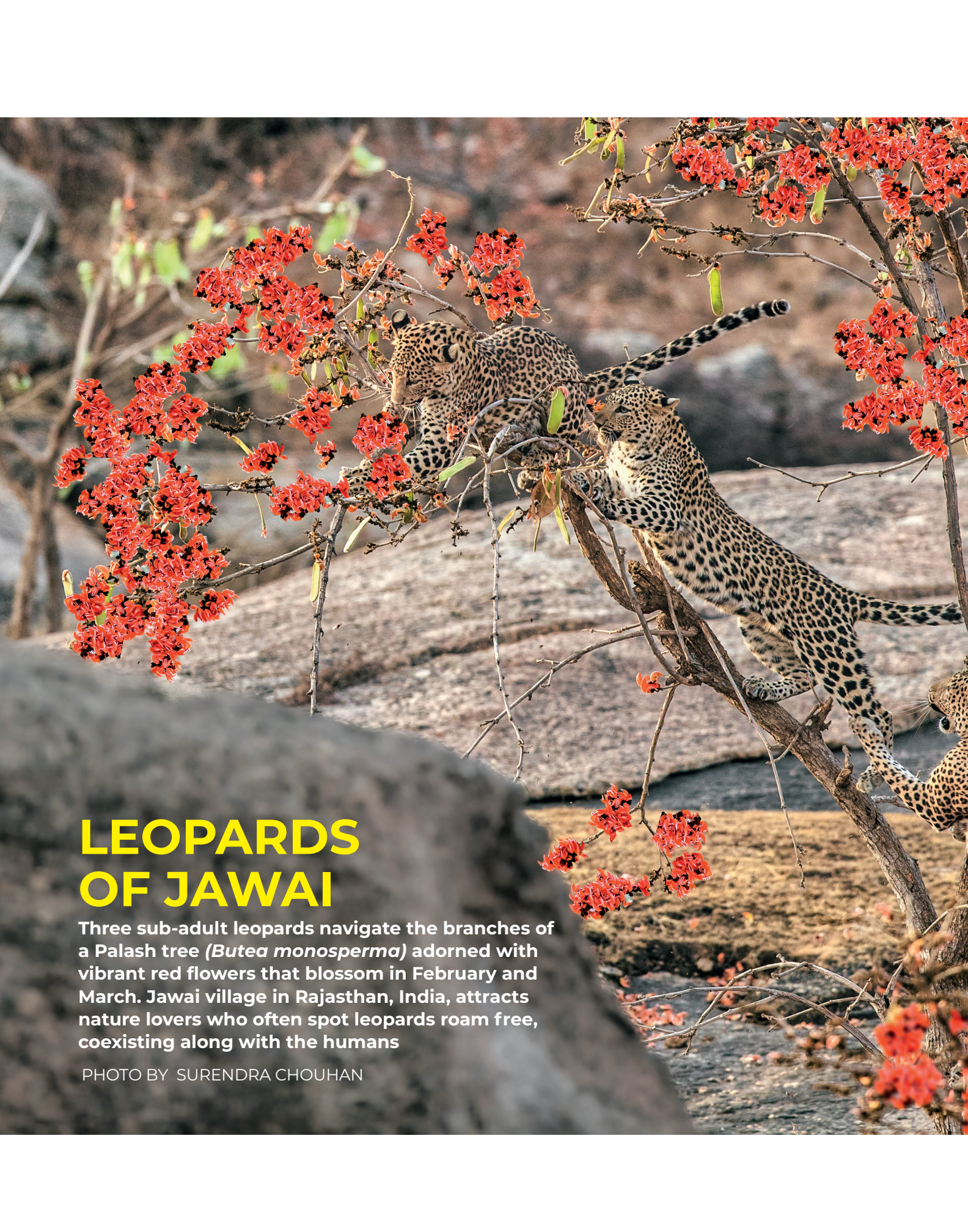
African
Cheetah
in Peril

Protecting

Persian
Leopard

India's
10
Years of
Conservation



A photograph of three leopards climbing a Palash tree (Butea monosperma) with vibrant red flowers. The leopards are positioned on different branches, with one at the top, one in the middle, and one at the bottom right. The background shows a rocky landscape and a body of water.

LEOPARDS OF JAWAI

Three sub-adult leopards navigate the branches of a Palash tree (*Butea monosperma*) adorned with vibrant red flowers that blossom in February and March. Jawai village in Rajasthan, India, attracts nature lovers who often spot leopards roam free, coexisting along with the humans

PHOTO BY SURENDRA CHOUHAN



Saving Big Cats is Smart Economics



Ride a tiger, paper tiger, a leopard can't change its spots, a lion's share, a cheetah in business – how often we use some of these expressions in our everyday conversations. Their usage signifies the strong connection humans have had with some of the apex predators who symbolise power, majesty and the force of nature. We admire their mystique, fear their power and are inspired by their resilience. Our art, literature and cultural ethos represent their best qualities and deepest expressions.

Yet, today, most big cats are in danger, threatened largely by human settlements, illegal trade and habitat loss. Envisioning the future with big cats is a critical exercise not only for environmentalists and wildlife experts but also economists, landscape architect, agriculturalists, and others. They are vital to our ecosystems. Saving them makes smart economics, say World Bank President Ajay Banga and former World Bank President Robert B Zoellick in a special Op-Ed article for our magazine.

Equally important is promoting the concept of biodiversity credits, by moving beyond carbon markets and creating strong financial mechanisms for biodiversity conservation. This issue explores how bio-credits can be the next big breakthrough in sustainable development.

Continuing with our efforts in identifying the challenges to big cats, in this issue we focus on the Persian leopard, a species listed as Endangered on the IUCN Red List. It has lost close to 72%-84% of its historical range. Our cover story highlights efforts made by countries like Kazakhstan, Afghanistan, Iran, Iraq and Türkiye in protecting the species.

In this issue, we also celebrate India's decade of conservation under the leadership of Prime Minister Narendra Modi. India is home to world's largest tiger population, and continues to increase its population of the Asiatic lion, leopards and the one-horned rhinoceros. Adopting a scientific management approach, greater use of technology and community participation have all contributed in supporting India's conservation milestones.

Rare pictures of snow leopards, the Royal Bengal tiger and the African cheetah in this issue should hopefully make our readers value the presence of big cats in our world. These bold creatures make it beautiful. 🐾

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MALVIKA KAUL

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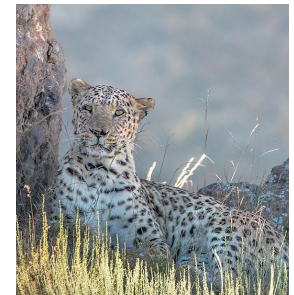
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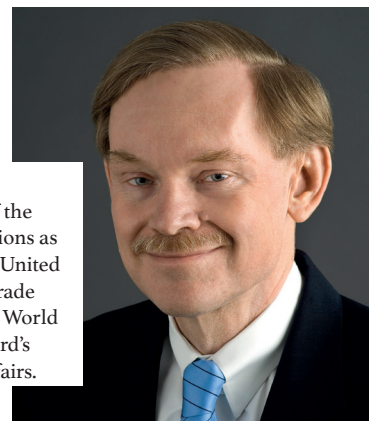


Ajay Banga pg 06

Ajay Banga is the President of the World Bank Group. He is the first person of South Asian ancestry to hold the position. At the World Bank, he has led the adoption of a new vision and mission for the organisation to create a world free of poverty, on a liveable planet. Under his leadership, the Bank has undertaken a broad set of reforms to boost lending capacity, simplify operations, and deliver development solutions that are practical, scalable, and impactful.

Robert Bruce Zoellick pg 06

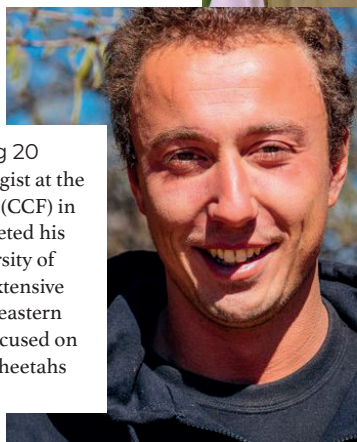
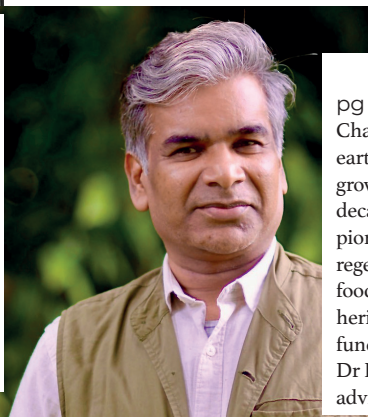
Robert Bruce Zoellick was the 11th president of the World Bank (2007-2012). He has also held positions as the Managing Director of Goldman Sachs, the United States Deputy Secretary of State, and the US Trade Representative. Since ending his term with the World Bank, Robert has been a senior fellow at Harvard's Belfer Centre for Science and International Affairs.



Dr Chandrashekhar M Biradar

pg 18

Chandrashekhar M Biradar is a distinguished earth system scientist, ecologist, and global green growth leader having worked for over three decades in Asia, Africa, and the Americas. He pioneers biodiversity-based agroecosystems, regenerative agriculture, green growth in drylands, food forests, and eco-tourism. A champion of heritage food systems, ecosystem restoration, and functional landscapes, and biodiversity finance, Dr Biradar has authored over 400 publications and advises global institutions and governments.



Dr Stijn Verschuere pg 20

Stijn Verschuere is an ecologist at the Cheetah Conservation Fund (CCF) in Namibia and recently completed his doctoral degree at the University of Antwerp in Belgium. With extensive experience across Namibia's eastern landscapes, his research is focused on the distribution patterns of cheetahs and other large carnivores.

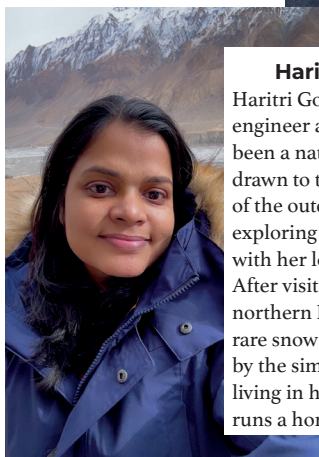
Dr Laurie Marker pg 20

Laurie Marker is a conservation biologist recognised as one of the world's leading experts on cheetahs. As Founder and Executive Director of the Cheetah Conservation Fund (CCF) in Namibia, Laurie has pioneered research, established conservation models, and created cooperative alliances on behalf of the cheetah that never before existed. Under her leadership, CCF has grown into a world-class cheetah research, education, and conservation institution.



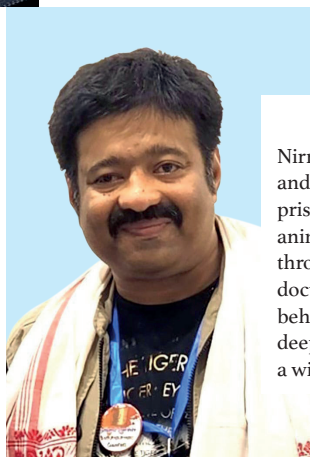
Haritri Goswami pg 24

Haritri Goswami is a software engineer and since childhood has been a nature and mountain lover drawn to the tranquillity and beauty of the outdoors. Her passion for exploring the Himalayas, combined with her love for wildlife photography. After visiting the Spiti Valley in northern India and encountering the rare snow leopard, she was inspired by the simple lifestyle of communities living in harsh environment. She now runs a homestay in the valley.



Dr Nirmalya Chakraborty pg 28

Nirmalya Chakraborty is a passionate nature lover and wildlife explorer. He has travelled to various pristine habitats and documented unknown animal behaviour and key conservation issues through strong photo storytelling and wildlife documentaries. He is passionate about filming tiger behaviour and the secret life of elephants in the deep woodlands of India. He edits Jungle Rhythms, a wildlife magazine.



Preserving Nature Makes Smart Economics

BY AJAY BANGA AND ROBERT B ZOELICK

Many of us admire big cats and other wild species for their extraordinary beauty and the richness they add to the world. They are fierce, endangered, and vital to the ecosystems they help balance. But preserving nature is also a livelihood for a growing number of people around the world — especially in places where other opportunities are scarce.

Preserving nature underpins hundreds of millions of jobs globally. Forestry supports 50 million workers. Small-scale fisheries sustain up to 500 million. Nature-based tourism, one of the fastest-growing sectors in global travel, employs millions more — often in regions where few other sources of income exist.

In these areas, nature is not just beautiful. It's bankable. It provides the first step on the ladder to the middle class — a step that communities can build without destroying the ecosystems they depend on.

Big cats offer a powerful lens to understand this dynamic.

Today, big cats roam in 95 countries across Asia, Africa, and the Americas. Their story mirrors the challenges and choices of development — a mix of progress, missed opportunities, and cautionary tales. These apex predators often share their landscapes with some of the world's poorest communities. As climate shocks intensify — floods, droughts, land degradation — natural resources become scarcer. Conflict follows: big cats attack livestock, and sometimes people. In turn, people retaliate, either to protect their livelihoods or to profit from the illegal wildlife trade.

And the profits are high. The global illegal wildlife trade is thriving, and big cat parts remain especially lucrative. That's why we work with law enforcement partners through the International Consortium to Combat Wildlife Crime. Together, we help countries dismantle the high-reward, low-risk dynamics that fuel wildlife crime — from crime scenes to courtroom steps. Strengthening governance in this way is not just good conservation; it's smart development policy.

But this is not a story of decline. It's a story of potential — and of progress.

In Nepal, the tiger population has tripled over the past two decades, while forest cover has doubled. Crucially, that conservation success is creating livelihoods. Our research shows that 45% of international visitors come to Nepal to experience its natural beauty. Around Chitwan National Park — home to 128 of the country's 355 tigers — tourism-related jobs now employ 3% of the working-age population. That's not just spending — it's economic lift. Each dollar from a tourist grows by nearly 80% as it moves through local jobs, services, and supply chains.

In Bangladesh, a mix of anti-poaching patrols, fencing, and community engagement has helped boost tiger populations without a rise in human-wildlife conflict. In Uganda, former

poachers are now trained wildlife rangers, tracking lions in national parks and turning conservation into steady work. In Mexico, jaguar cubs are being rehabilitated and released into the wild, backed by foundations that support both nature and local communities.

India — home to five species of big cats: leopard, lion, snow leopard, tiger, and cheetah — has gone even further. It has built a model of nature-positive development that lifts both biodiversity and GDP. India hosts the world's largest tiger population and has revived the Asiatic lion through Project Lion. These achievements now fuel a booming tourism sector, with marquee tiger parks like Ranthambore emerging as engines of economic growth. Ranthambore alone attracted over 650,000 visitors in 2023–24 — a number growing by up to 15% year-on-year — creating jobs and nurturing local talent among forest-dependent communities.

The ripple effects are real. Nature-based tourism brings income, sparks entrepreneurship, and creates jobs — especially in rural areas. Global research we've conducted shows that every dollar invested in national parks delivers an economic return of at least six times the original investment.

This success wasn't accidental. It came from deliberate strategies to integrate conservation into development — across three pillars:

Global research shows that every dollar invested in national parks delivers an economic return of at least six times the original investment

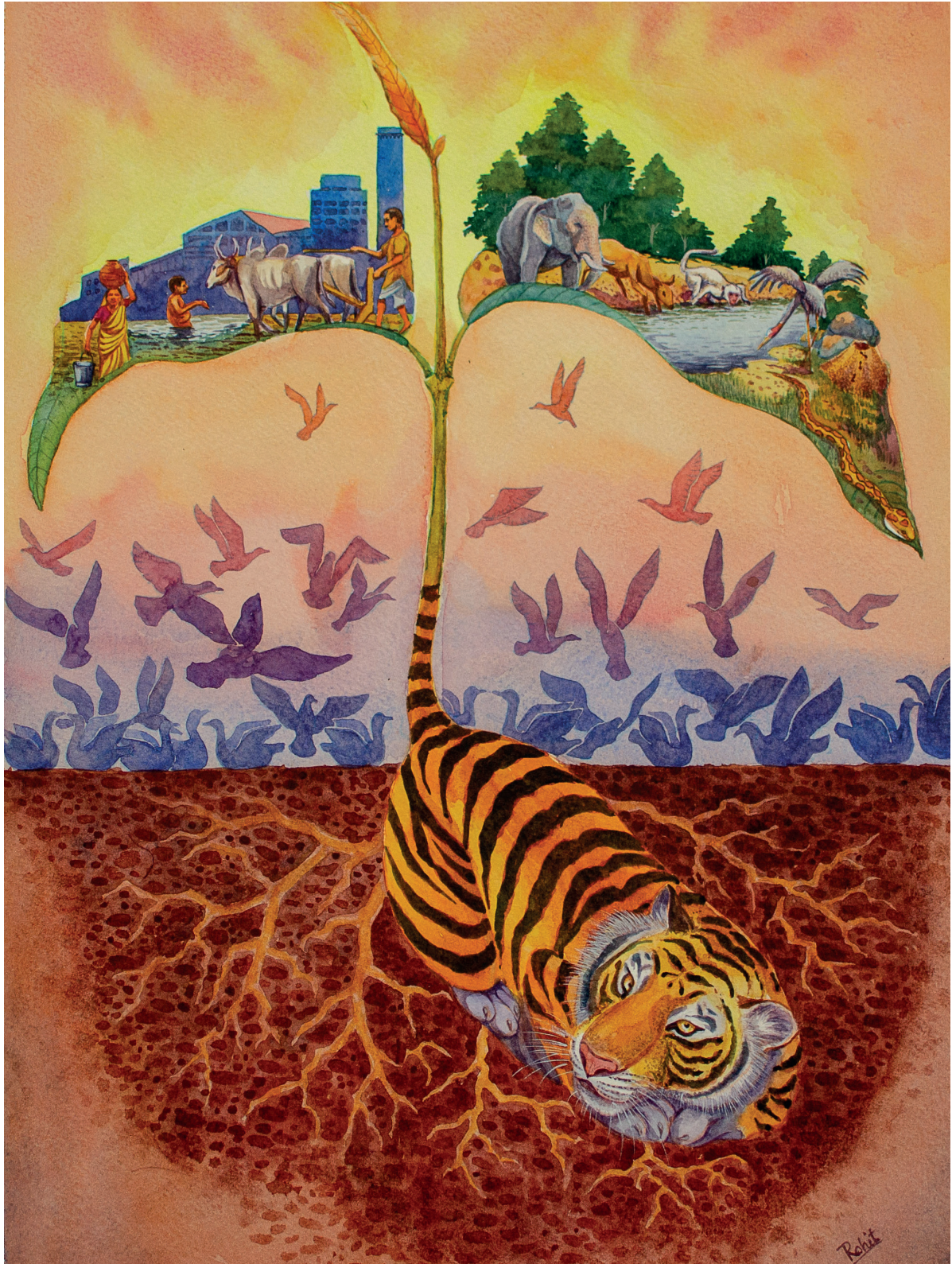
managing nature, building businesses around it, and sharing the benefits. The World Bank Group helped champion this model through the Global Tiger Initiative, launched in 2008, which united 13 tiger-range countries to craft national action plans — a milestone that culminated in the 2010 St Petersburg Tiger Summit. India's recent launch of the International Big Cat Alliance (IBCA) builds on that legacy — enabling countries especially across the Global South to share knowledge and scale solutions. Its collaboration with the Sankala Foundation to publish BigCats magazine is one more example of homegrown leadership and innovation.

Preserving nature is smart economics. It creates jobs where few others exist. It opens doors to inclusive growth. And it strengthens the foundations for a better, more sustainable future.

No species tells that story more powerfully than the big cats. 🐾

Ajay Banga is President of the World Bank Group.

Robert B. Zoellick was president of the World Bank from 2007 to 2012.



Tribal artist Rohit Shukla from central India depicts in his work Baagh Beej (Tiger Seed) the tiger as the seed of all biodiversity. From this seed sprout the plants that support both the natural ecosystems and human life



1. Prime Minister Narendra Modi during a lion safari at the Gir Wildlife Sanctuary, Gujarat, in March 2025 **2.** PM Modi at the Theppakadu Elephant Camp in Mudumalai Tiger Reserve with elephant whisperers Bomman and Bellie **3.** PM Modi watches after releasing a cheetah at Kuno National Park, Madhya Pradesh

INDIA'S Conservation DECADE (2014-2024)

India is one of the world's most biodiverse countries. It also has the world's largest number of tigers (3,682) and continues to increase its population of the Asiatic lion, pegged at 674 based on 2022 survey. Other species like the one-horned rhinoceros and the leopard have also thrived in last decade. Behind such achievements lies the steely determination of national leaders, like Prime Minister Narendra Modi, and several government decisions focussed on scientific management, greater use of technology and community participation that have placed India in the arena of biodiversity leadership. Since 2014, India's Prime Minister has exhibited

extraordinary commitment to preserving the natural heritage and in increasing the survival potential of several species. In the last decade, he has motivated the Ministry of Environment, Forest and Climate Change (MoEFCC) to institute a comprehensive framework of policies, legislative measures, and initiatives aimed at conserving and protecting India's wildlife. India has also developed robust infrastructure and trained personnel at the grassroots level to combat poaching as well as illegal wildlife trade in the country.

Here is a glimpse of some of the key ideas and initiatives that have made India a conservation force to reckon with:

2



3



Doubling India's Wild Tiger Population

In 2010, tiger conservation received global attention following a dangerously low estimate of 3,200 tigers in the wild. In response, leaders from the 13 tiger range countries (TRCs) committed to doubling the wild tiger population by 2022, popularly referred to as the 'Tx2' goal, which generated the support of international donors and conservation agencies. More than a decade later, at the 50th anniversary of Project Tiger, Prime Minister Modi announced that the tiger population in India has grown from 2,226 in 2014 to 3,682 in 2022. Today India hosts the world's largest tiger population (70%), although it has barely 18% of global tiger habitat. A key factor behind the success has been reduction in anthropogenic pressure, restoration of natural habitats and combatting wildlife crime. The flow of ecosystem benefits from selected tiger reserves ranges from US\$769 ha⁻¹ year⁻¹ to US\$2923 ha⁻¹ year⁻¹.

Prime Minister Modi stated on 9 April 2023, during the commemoration of 50 years of Project Tiger, that the "success of Project Tiger is a matter of pride not only for India but also for the world. India has not only conserved tigers but has also given them an ecosystem to flourish."

Lions are Forever

India is home to the Asiatic lion, found only in the Gir Forest of Gujarat. The population of lions has shown a steady increase, reaching 674 in 2020 (with an increase rate of close to 29%) from

Today India hosts the world's largest tiger population (70%), although it has barely 18% of global tiger habitat

the 523 lions in 2015. The government has put significant effort into habitat restoration and management for the lions. In early 1990s, the Gujarat state government decided to work with 39 villages around the Girnar Wildlife Sanctuary to get support for creating more space for the lion population to thrive. Rejuvenating and maintaining water bodies and soil moisture within the Gir landscape also ensured a reliable water supply for prey species and lions, especially during the dry season. Besides habitat improvement, Project Lion has used various technologies – radio-collaring, camera traps – to protect the threatened species. Prime Minister Modi announced an investment of ₹2,927 crore (USD 350 million) for Project Lion, which includes establishment of a National Referral Centre for wildlife in Gujarat to improve disease tracking.

Return of the Cheetah

India's Project Cheetah is an ambitious conservation effort involving bringing back the species. Started in 2022, this is the world's first intercontinental translocation of a large carnivore. The first set of cheetahs arrived from Namibia and another 12 followed from South Africa. Despite challenges, the project (housed in Kuno National Park) has experienced substantial successes – birth of 21 cubs and release of a group of cheetahs in the free-ranging zones. On 20 April 2025, two male cheetahs were relocated from Kuno National Park to a new wildlife sanctuary Gandhi Sagar in the western part of Madhya Pradesh. While releasing the first cheetahs on 17 September 2022, Prime Minister Modi said bringing cheetahs back to India will help in the restoration of open forest and grassland ecosystems and also lead to enhanced livelihood opportunities for the local community.

Over the next decade, the Indian government envisions creating a connected landscape—a cheetah metapopulation spanning Kuno, Gandhi Sagar, and other potential habitats, including the Banni Grasslands in Gujarat. This approach will lead to gene flow, natural dispersal, and population resilience.

Protecting Asian Elephants

Can tiny bees help huge elephants? In Project Elephant such innovative ideas have helped secure the future of the rare and endangered Asiatic elephant. Project Elephant was started to protect the Asian elephant and its habitats. In the last 10 years, 8,600 sq km has been added to the network of elephant reserves, thus taking the total protected area under this project to over 80,000 sq km across 14 states. Over 138 elephant corridors have been identified and a critical focus has been reducing the human-elephant conflict that has often resulted in fatalities. Project RE-HAB (Reducing Elephant-Human Attacks using Bees) began in 2021 in the state of Karnataka. Bee boxes were used as fence to prevent elephants from entering human habitations. This eventually reduced the loss of lives of both humans and elephants. India is now home to the largest and most stable population of Asian elephants.

Saving Great Indian Bustard from Extinction

The Great Indian Bustard (GIB) is a large, critically endangered bird known for its majestic appearance and inhabiting arid and

semi-arid grasslands. However, with less than 150 individuals left in the wild, it faces severe threats from habitat loss and power line collisions. In 2016, the National Bustard Recovery Programme was launched with the aim of pulling both, the GIB and the Lesser Florican, back from the brink of extinction. Today, the GIB has become the flagship species for grassland conservation. In recent years, captive breeding using ex-situ techniques like artificial insemination have supported the programme. In 2023, the world's first GIB chick hatched through artificial insemination. More such successes followed in 2024 and early 2025. India also brought the GIB into the Convention on the Conservation of Migratory Species (CMS) framework for international cooperation in its conservation.

Making Every Snow Leopard Count

The Snow Leopard Population Assessment in India (SPAII) programme is the country's first scientific effort to report the snow leopard population. Based on the survey conducted between 2019 and 2023, the SPAII declared 718 individuals in India, pointing that 70% of the potential snow leopard range is across the trans-

A GIB in an agricultural field along with a couple of chinkaras, Rajasthan



Photo: Radheshyam Pemani Bishnoi

The Snow Leopard Population Assessment in India programme is the country's first scientific effort to report the snow leopard population

Himalayan region, including the union territories of Ladakh and Jammu and Kashmir, as well as states like Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh. This survey covered 13,450 km² of trails for snow leopard signs and deployed camera traps at 1,971 locations for 180,000 trap nights. Consistent monitoring will ensure the long-term survival of this elusive species.

Mission LiFE, a Movement for Sustainable Living

Launched in 2022, Mission LiFE (Lifestyle for Environment) has marked a major shift in India's conservation strategy, placing people at the heart of climate action. This India-led global

The campaign mobilised citizens to plant 800 million seedlings, a wonderful example of how emotional engagement of the public can be harnessed to create ecological impact

initiative encourages individuals to adopt 75 simple, sustainable practices in areas like water use, energy, waste, food, and lifestyle. By 2028, it aims to mobilise one billion 'Pro-Planet People' and make 80% of India's villages and urban local bodies environment-friendly. So far, over 35 million people have participated in more than 1.6 million awareness events held across India. Even small actions like using cloth bags or switching off vehicle engines, can lead to massive savings: up to 22.5 billion kWh of energy, 9 trillion litres of water, and 375 million tonnes of solid waste. Mission LiFE, recognised by platforms like the Intergovernmental Panel on Climate Change (IPCC), the G20, and the United Nations Environment Assembly (UNEA-6), stands out as India's people-powered contribution to global environmental conservation.

A Global Alliance for Big Cats

Launched in 2023 by Prime Minister Modi to commemorate 50 years of Project Tiger, the International Big Cat Alliance (IBCA) is a bold initiative designed to address the urgent need for global big cat conservation. Headquartered in India, IBCA brings together 95 range countries to protect seven major big cats: Cheetah, Jaguar, Leopard, Lion, Puma, Snow Leopard and Tiger. With its conservation ethos and experience in protecting the tiger, lion and leopard, India is well placed to offer skill and understanding in tackling conservation challenges. The alliance aims to foster collaboration, promote conservation best practices, and serve as a central resource for expertise and funding. Its approach goes beyond wildlife preservation, linking biodiversity conservation with climate resilience, sustainable livelihoods, and the broader framework of the Sustainable Development Goals (SDGs).

Planting Trees for Mother

The 'Ek Ped Maa Ke Naam' (Plant a tree in your mother's name) campaign was launched on World Environment Day (5 June 2024) by Prime Minister Modi. He urged all citizens to plant trees as a tribute to their mothers. The campaign mobilised citizens to plant 800 million seedlings, a wonderful example of how emotional engagement of the public can be harnessed to create ecological impact. Pledging to protect trees and mother earth, the campaign aims to halt land degradation, build drought resilience and prevent desertification. This campaign is part of India's quest to increase the green cover.



Prime Minister Modi interacting with frontline staff in the Kaziranga National Park

Creating a Safety Zone for One-horned Rhinoceros

The remarkable recovery of the one-horned rhinoceros population is largely due to intensified anti-poaching efforts. In Assam, its natural refuge, there has been a 86% drop in cases since 2016 and even zero poaching in 2022! This is a major conservation milestone for Project Rhino of India that aims to protect a species considered near extinct just a few decades ago. Hunted for sports and for its horn (believed to have medicinal value), the rhinoceros's first critical refuge was Kaziranga National Park in the northeastern state Assam. Habitat expansion and translocation programmes played a crucial role in expanding their range and boosting genetic diversity. 🐾

Compiled by **BigCats Bureau**

The Persian leopard making its way through the steppe and juniper woodland vegetation of Golestan National Park, Iran

Photo: Jafar Panahpour

Protecting the Persian Leopard

Four years ago, range countries formed the Persian Leopard Working Group aimed at the conservation of a species listed as Endangered on the IUCN Red List. The Executive Council members of this alliance share how different countries plan to keep the leopard thriving in the wild

BY THE PERSIAN LEOPARD WORKING GROUP

Persian leopards (*Panthera pardus tulliana*) move like ghosts across the steep and rugged mountains and semideserts in Southwest Asia they call home. Their ability to mostly tiptoe around humans is perhaps a function of the persecution, and the loss of habitat and prey that many big cats faced in this region. Retaliatory killing due to human-leopard conflict, poaching of the prey and competition with livestock drove the leopard population to near extinction in some countries, and severe fragmentation in others.

Persian leopards were once distributed across most of the Caucasus region, the Iranian and Anatolian Plateaus and the southern parts of Southwest Asia, avoiding true deserts and human landscapes. But by the mid-20th century leopards had disappeared from large parts of their historical range, which once included the territories of today's Afghanistan, Armenia, Azerbaijan, Georgia, Iran, northern Iraq, northern Israel, Jordan, Lebanon, Türkiye, western Pakistan, Russian Caucasus,

Having lost somewhere between **72-84%** of its historical range, today the biggest leopard population is found in Iran with somewhere between **528-732** individuals, followed by Turkmenistan with **60-80** individuals

Syria, southern Turkmenistan, Tajikistan and Uzbekistan. In some cases, hunting rewarded by official bounties expedited the decline in some countries, including Armenia, Azerbaijan, Georgia and Russia. Today, there are no recent confirmed records from Uzbekistan, and only single numbers of occasional migrants in Kazakhstan and Georgia. The leopard is declared extinct in Israel, Lebanon,

Palestine, Syria and Tajikistan.

Having lost somewhere between 72-84% of its historical range, today the biggest leopard population is found in Iran with somewhere between 528-732 individuals, followed by Turkmenistan with 60-80 and likely inflated 63-97 in the Caucasus Ecoregion.

Despite being protected under national legislation across the range and internationally under the Convention on International Trade in Endangered Species of Wild Animals (CITES), the Convention on the Conservation of Migratory Species of Wild Animals (CMS), and the Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), the Persian leopard's present and future continue to face some major threats such as illegal hunting, habitat fragmentation and loss, human-leopard conflict, prey loss, and climate change.

The Persian leopard is currently listed as Endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. In order to respond to the urgent need for a



Photo: Jafar Panahpuor

The apex predator of the high mountains of Iran

A herd of urial in the highlands of Golestan National Park

Photo: Jafar Panahpuor



comprehensive conservation approach for the Persian leopard, its prey species and their habitats, the IUCN Species Survival Commission's (SSC) Cat Specialist Group spearheaded the initiative to develop the Range-Wide Strategy for the Conservation of the Persian leopard under the auspices of Convention on the Conservation of Migratory Species of Wild Animals and its Central Asian Mammals Initiative (CAMI).

In 2022, the majority of the range states came together to develop and endorse the strategy, which provides a comprehensive framework for targeted conservation actions. A decision was made to establish the Persian Leopard Working Group (PeLeWG) as an affiliated partner of the IUCN/SSC Cat Specialist Group to serve as a technical coordination group for planning and supporting Persian leopard conservation actions, including implementation of the relevant activities of the CAMI Programme of Work and the Strategy.

Persian leopards inhabit a wide variety of habitats and ecosystems from lowlands at the sea level up to 3,000 m in

elevation, encompassing montane forests and open woodlands, grasslands and cold desert ecosystems. The preference is given to precipitous cliffy and rocky areas, especially those covered by open juniper and pistachio woodlands providing cover for hunting and resting places. These are the same areas where the main leopard prey is found, depending on the region: urial sheep, mouflon, bezoar goat, East Caucasian tur, West Caucasian tur, chamois, wild boar, red deer, fallow deer, roe deer, goitered gazelle, and Indian crested porcupine. Leopards can prey also on small species such as chukar, snowcocks, hares and Afghan pika. However, often the lack of wild prey drives leopards to kill domestic livestock and dogs for survival, thus bringing leopards into conflict with people. Usually, local people retaliate by killing leopards.

Persian leopards can move long distances in search of prey and mates. In Kazakhstan, two leopards are known to have travelled back and forth over more than 200 km in the past six years. Elsewhere, long dispersals were reported

for a male who moved between Bamu and Bakhtegan National Parks in Iran (112 km), a male in Azerbaijan and Armenia and a male in Armenia and Türkiye. Prey availability, population density, age, sex and reproductive status all affect the ranging behaviour of leopards. A prey-rich environment will have greater leopard densities and often smaller home ranges.

Habitat fragmentation, loss of prey base and conflict with local people over livestock depredation cause population declines throughout the range. Leopards are killed in retaliation to killing livestock and dogs, as well as rare attacks on people in some areas. They are also trapped and persecuted because of fear or the intention to illegally trade their skins, paws and other products.

Linear infrastructure, especially border fences, severely hamper the movements of leopards as well, as does the armed conflict. The presence of landmines along some state borders in the region may deter poachers but kill or maim leopards. Diseases of Persian leopards are poorly studied, but plague, feline infectious

peritonitis, canine distemper and rabies are some of them which can potentially be dangerous and even deadly for these cats.

What countries are doing for leopards

In Afghanistan, the Persian leopard has been listed on the country's Protected Species List, because of which the species receive the highest level of protection. The Government of Afghanistan has declared three protected areas, the 'Band-e-Amir' National Park, the Bamyan Plateau Protected Landscape, and the Nuristan National Park within the Persian leopard distribution range in the central and eastern parts of the country. Among other conservation measures taken in Afghanistan are the community and park rangers who conduct patrols in parts of the Persian leopard range. The Kabul Zoo has been an active rehabilitation centre for the orphaned, injured, and confiscated Persian leopards. Moreover, the Afghanistan's National Environmental Protection Agency, through its local teams in the field closely monitor the wildlife related issues.

Despite the conservation measures, the prolonged war and unrest coupled with the spread of weapons across the country have posed major threats to the species and its wild prey. The recent change in regime exacerbated the poaching of the wild ungulates in some parts of the country, and lax law enforcement fuels trade in leopard pelts.

The South Caucasus (Armenia, Azerbaijan, Georgia) enjoys arguably the longest and most comprehensive project focused on Persian leopard conservation, which has been conducted since 2002 up to now by World Wide Fund for Nature (WWF) under financial support from WWF Germany and WWF Switzerland. Introduction of the hunting ban in the Nakhchivan Republic of Azerbaijan in 2001 allowed to magnify the effectiveness of this project.

In Iraq, the Persian leopards inhabit the rugged terrain of the Zagros Mountain Forest Steppe ecoregion, which forms a vital corridor for leopard connectivity between Iran and Türkiye. Despite the challenges of political instability and



Photo: Jafar Panahpour

habitat fragmentation, recent conservation efforts have revealed promising signs of recovery. In 2022, the first-ever breeding record of Persian leopards in Iraq was documented by the Leopards Beyond Borders (LBB) and Bamo Leopard Group team using camera traps. This discovery underscores the ecological importance of the area and its potential to support a thriving leopard population, challenging the earlier assumption that only dispersing males visited Iraq. The LBB is leading efforts to establish Iraq's first Community Conserved Area in the Bamo Mountains, using the Persian leopard as a flagship species.

Significant challenges like habitat loss, retaliatory killings, and human-leopard conflict continue to threaten leopard populations. More recently, there are plans for the construction of physical pole-and-barbed-wire fences along the Iraq-Iran border near the Bamo Mountains, as well as cement walls along the Iraq-Türkiye border, which raises serious concerns about the future movement and connectivity of Persian leopards. Additionally, security threats such as landmines near the Iraq-Iran border, drone strikes, and the burning and cutting of natural forests along the Iraq-Türkiye border further endanger the safety and viability of these transboundary

leopard populations.

In Kazakhstan, until the end of the 20th century, the leopard was not recorded by specialists for the fauna of this country, however, in the period from 2007 to 2024, it is reliably known about at least 5 individual males which came into the Mangistau region of Kazakhstan from the neighboring territory of Turkmenistan. Since 2023, the Biodiversity Research and Conservation Center (BRCC) together with the Association for Conservation of Biodiversity of Kazakhstan (ACBK), supported by Conservation X Labs, in partnership with the Ustyurt State Nature Reserve (USNR) and a network of regional protected areas have been monitoring the presence of leopards using camera traps; working on reducing the impact of border fences on transboundary migrations of ungulates, the main prey of the leopard by piloting openings in the border fence with Turkmenistan and Uzbekistan; contribute to the optimisation and expansion of the network of protected natural areas as well as working on a series of outreach activities to facilitate coexistence between local communities and wildlife. The Persian leopard was included in the Red Data Book of Kazakhstan in 2021. In the same year, an Action Plan for the Conservation of the

A typical habitat of the Persian leopard in Khosrov Forest Reserve, Armenia

Photo: Vladimir Cech Jr.



Persian Leopard in Kazakhstan for 2022-26 was prepared and approved.

In Russia, the federal Project of the Persian leopard recovery in the Russian Caucasus is implemented through the reintroduction of captive bred animals. The Project was initiated in 2005 by A N Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences and WWF-Russia, and it was approved for the implementation on the governmental level in 2007 (under management of the Ministry of the Natural Resources and Environment of the Russian Federation). The goal of the project, which to date continues to be supported by the Ministry of Natural Resources and the Nature and People, an NGO, is to create a Persian leopard population nucleus in the northern part of its historical range, where the species disappeared due to direct and indirect human influence in mid-20th century. Eight males and seven females were released into the wild from 2016 till 2023 in two sites in Ossetia, using leopards bred in the Sochi Breeding

Center. Successful survival of released animals during a full year cycle was scientifically confirmed thanks to post-release monitoring with satellite GPS-VHF collars and field surveys of kill-sites and other important places. Breeding in the wild was not observed so far.

In Türkiye, the Leopard Research Unit of the General Directorate for Nature Conservation and National Parks (NCNP) is responsible for monitoring populations of leopards and their main prey species within the leopard distribution in the Mediterranean, Caucasus and the south-eastern Türkiye. The NCNP is currently developing the National Leopard Conservation Action Plan and several new protected areas are planned to interconnect existing protected areas in the western Mediterranean. Led by researchers from multiple research institutions and the NCNP officials, there is also an ongoing research project funded by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) aiming to assess the distribution range, individual numbers and

population genetics of the leopards in the Mediterranean Region. Leopard research in the Lesser Caucasus is conducted by the local university researchers in the region. The leopard is a strictly protected species under the Turkish Hunting Law with a fine of 3,000,0000 Turkish Liras (USD 84,595) for killing an individual.

In Turkmenistan, Team Bars Turkmenistan, supported by Conservation X Labs, and in partnership with the Ministry of Environmental Protection, is monitoring the population (currently estimated to be around 60-80 individuals) and working with protected area management to strengthen antipoaching efforts, including through the use of SMART, a tool to help minimise threats to wildlife and conservation areas. The Team is also supporting the government in setting up a new cluster of protected areas in the northwest of the country, an important leopard stronghold and ecological corridor for leopard dispersal to Kazakhstan. It is working with local herding communities to mitigate conflict with leopards; and

Gazetting Reserves

In Iran, where the largest population of Persian leopards persists, there are approximately 500-800 leopards living in most of the country's mountainous landscapes. Although the species is protected by law, conflict with local people remains one of its main challenges for survival. Nonetheless, the species has been making a comeback in recent years, particularly in central desert mountainous landscapes, thanks to increased conservation actions, such as the gazetting of multiple reserves.

In contrast, the status of the species in the Caucasian region remains quite uncertain, with limited records from border reserves shared with Armenia and Azerbaijan. In the Alborz and Kopet Dag mountains, the latter situated along the Iran-Turkmenistan border, it is estimated that more than 200 leopards still reside, representing the largest population nucleus of leopards in west and central Asia. A recent satellite telemetry study in this area showed that Persian leopards have some of the largest home ranges ever recorded for leopards, with adult males covering an area of around 100 sq km, indicating their substantial spatial requirements.

negotiating to create wildlife passages on the border with Kazakhstan.

In Pakistan, there remain uncertainties on the taxonomy of leopards and regardless of their genetic profiles are all critically endangered and remain in great need of conservation. Despite the taxonomic uncertainty, leopard occurrence has been documented across all provinces and states of Pakistan. A recent camera trapping study also documented leopards sharing their habitat with snow leopards, capturing both

Parviz Fatullayev checks a camera trap on the Zangezur Ridge in Azerbaijan's Nakhchivan Autonomous Republic. Breeding females are present on the Nakhchivan and Armenian sides of the Zangezur Ridge

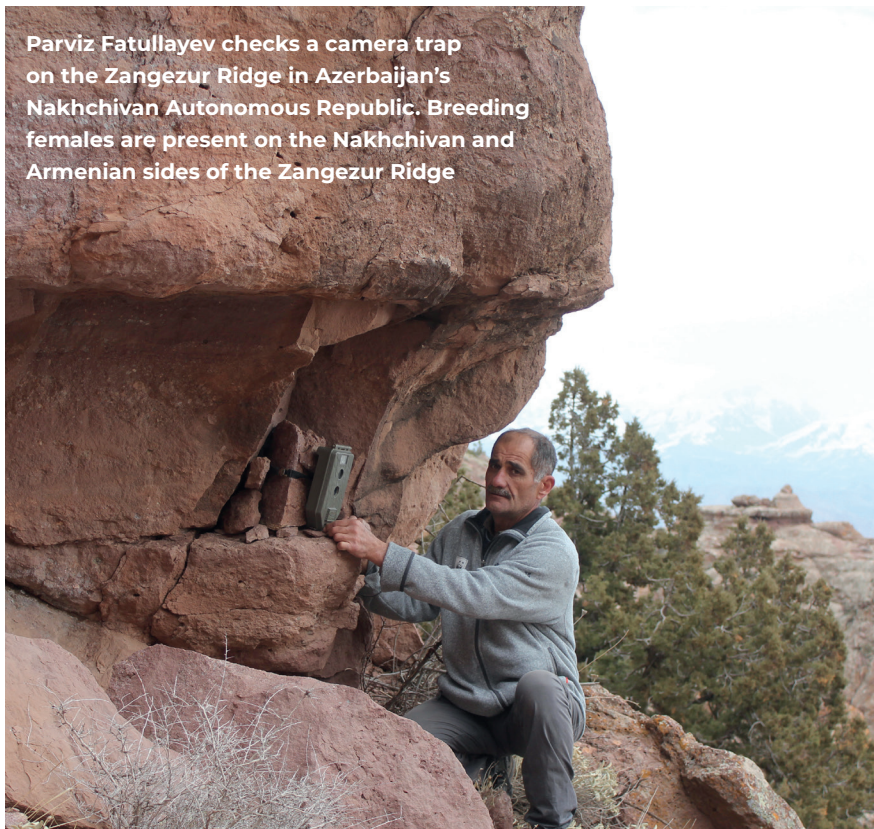


Photo courtesy WWF Azerbaijan

species at the same stations. Notably, this study recorded the highest elevation point of leopard occurrence in Pakistan. The Persian leopard population is believed to be distributed along the Iran and Afghanistan borders; however, these areas remain poorly explored and studied. Furthermore, weak law enforcement and fencing along the borders put an additional pressure on the already fragmented leopard populations in these regions. Approximately 15 national parks in Pakistan currently support leopard populations. However, most of these parks are poorly managed and cover small areas, which limits their capacity to sustain viable populations. Recently, the Wildlife Ecology Lab at the University of Haripur initiated efforts to bring together all stakeholders (academia, wildlife managers, and indigenous communities) to collaborate on a shared conservation goal.

In Uzbekistan, despite the lack of modern records, the Babatag National Nature Park was established in 2022 in a potential leopard habitat, where camera traps are used on a permanent basis. The leopard is protected at the state level by being listed as Critically Endangered in the Red Book, with a fine of USD 85,630 for locals and USD 400,000 for foreigners for killing an individual.

Because of the shared nature of the challenges and threats faced, the PeLeWG strives to facilitate communication and collaboration amongst scientists and conservationists across the range, particularly by strengthening local technical capacities, building up professional knowledge and raising awareness to support the next generation of Persian leopard conservationists. 🐾

Contributors to this report include Konul Ahmadova, Mohammad Farhadinia, Ozgun Emre Can, Mariya Gritsina, Muhammad Kabir, Shirin Karryeva, Igor Khorozyan, Deniz Mengüllüoğlu, Zalmai Moheb, Hana Raza, Niloufar Raeesi, Tanya Rosen, Vladimir Terentiev and Anna Yachmennikova – all members of the Executive Council to Steering Committee of the Persian Leopard Working Group.



Biodiversity Credits The Next Big Thing

Biodiversity credits promise better wildlife conservation, financially rewarding communities, forest dwellers and tribals communities for protecting and restoring key ecosystems

BY CHANDRASHEKHAR M BIRADAR

For decades, carbon credits have been at the centre of global climate action, allowing companies and countries to offset emissions by investing in tree planting or renewable energy. But while carbon trading has grown into a multibillion-dollar market, it has largely ignored an even bigger issue: Biodiversity Loss.

Without biodiversity, carbon sequestration is incomplete. Forests, wetlands, grasslands, and regenerative agriculture store carbon not just in trees but in their rich web of plants, fungi, microbes, animals and soils. A biodiverse ecosystem is far more effective at capturing and storing carbon than a single-species

tree plantation. And now, policymakers and scientists are turning to a new solution: biodiversity credits.

Mere focus on carbon credits has flaws, they measure only the carbon stored, not the overall health of the ecosystem. This has led to unintended consequences, like monoculture tree plantations that store some carbon but devastate native biodiversity, deplete water resources, and make landscapes more vulnerable to climate change.

On the other hand, biodiversity credits recognise the full range of ecosystem services, from soil regeneration to pollination and water retention. The biodiverse forests store 30–40% more carbon than single-species plantations.

My research on agroecosystem approach highlights how functional agroforestry systems and regenerative practices not only sequester carbon but also restore degraded lands, broken food systems, enhance water availability, and provide sustainable livelihoods and climate resilience.

While forests get most of the attention in conservation finance, another sector holds vast potential: agriculture. Industrial farming has stripped landscapes of diversity, replacing rich ecosystems with monoculture crops. This has led to soil degradation, water scarcity, and declining nutrition, crop resilience in the face of climate change.

But the shift to sustainable agroecosystems such as multifunctional landscapes, agroforestry and regenerative farming offers a win-win: restoring biodiversity while increasing productivity, nutrition and climate resilience. Our multifunctional agroforestry systems can store 25–50% more carbon than conventional monocultures. These multifunctional landscapes enhance aboveground biomass and soil organic carbon through continuous canopy cover, deep root systems, organic matter inputs, and minimal soil disturbance, results in improved carbon storage while also supporting biodiversity, water retention, and farm resilience.

More importantly, farmers who maintain tree-based food systems and forgotten food crops (such as millets, pulses, tree-foods) can earn biodiversity credits while producing nutrient-rich, climate-resilient foods that are ecologically sustainable and economically viable.

Small Farmers, the Hidden Guardians of Biodiversity

Smallholder farmers, who cultivate more than 80% of the world's farms, are the frontline defenders of biodiversity. They are the custodians of traditional crops and knowledge systems that have sustained ecosystems for centuries. Their farming methods often involve diverse cropping systems, agroforestry, and natural regenerative practices that enhance soil health, sequester carbon, soil water, and support pollinators and beneficial insects.

In India, natural farming movements (like the Community Supported

Natural Farming in Andhra Pradesh, Multifunctional Agroforestry in Karnataka, Millets mission in Odisha) are reviving soil health without synthetic chemicals, restoring microbial biodiversity in ways that large-scale agribusiness cannot replicate. These methods not only improve soil fertility but also enhance carbon sequestration, making them prime candidates for biodiversity-based payments for ecosystem services (PES).

The PES are financial incentives given to landowners or communities in exchange for managing their land in ways that provide ecological benefits that go beyond food production. For example, planting diverse tree species, conserving habitats, improving soil health, and rainwater harvesting, etc., contributes to broader environmental goals. These payments can come from governments, NGOs, or private sector actors (like green investors or carbon markets, biodiversity finance), creating a sustainable income stream for farmers while promoting long-term stewardship of ecosystems.

A pioneering example is the Andhra Pradesh Community Managed Natural Farming (APCNF) programme, implemented by the Rythu Sadhikara Samstha (RySS). Launched in 2016, APCNF has transitioned over 10,37,000 farmers to natural farming practices across 4,83,000 hectares. This initiative promotes (a) Continuous soil cover with diverse crops, increasing soil organic matter and microbial diversity; (b) Minimal soil disturbance, allowing natural nutrient cycling and carbon storage; and (c) Use of biological stimulants, replacing chemical inputs with organic alternatives like fermented plant extracts.

The APCNF initiative has shown strong gains in biodiversity and ecosystem services, including a 55% increase in bird populations, a sevenfold rise in earthworms, and greater soil microbial activity—all pointing to healthier soils and better carbon and water retention. Natural farming under APCNF also reduces input costs and increases yields, with farmers reporting a 49% rise in net income, thanks to lower expenses and diverse, climate-resilient crops. Importantly, these practices have also boosted community well-being, including greater participation of women in the rural workforce.

Traditional crops and tree-based foods are vital for biodiversity restoration. Forgotten crops like millets, sorghum, jackfruit, tamarind, and moringa are resilient to drought, pests, and poor soils, making them ideal for regenerative farming. They require minimal inputs, support soil microbial diversity, enhance nutrient cycling, and provide nutrient-rich food, helping to address malnutrition and food insecurity in climate-vulnerable regions.

Unlike industrial monocrops that rely on chemical inputs, forgotten smart crops require minimal external support, reducing the environmental footprint. Their deep root systems enhance soil structure, functions, rhizosphere health, restore nutritional pathways, support nutrient cycling, and improve water retention, making them ideal for regenerative farming. In climate-stressed regions, these resilient biodiverse systems offer a natural buffer against erratic rainfall and temperature shifts. Beyond their ecological role, tree-based foods, forgotten crops significantly improve nutrition and rural livelihoods.

The biodiversity finance movement in India can be led by the National Biodiversity Authority and state biodiversity boards by implementing Access and Benefit Sharing (ABS) to reward ecosystem stewards. A national biodiversity credit system can attract investments in regenerative farming and agroforestry, repurpose and redirect harmful subsidies, and strengthen public-private partnerships, helping positioning India as a global leader in nature-based climate solutions.

Buffer Zones as Biodiversity Credit Hotspots

India, which hosts over 70% of the world's tigers along with leopards, Asiatic lions, and snow leopards, faces increasing threats to wildlife from habitat fragmentation, deforestation, and human-wildlife conflict. Biodiversity credits offer a game-changing solution by financially rewarding communities, forest dwellers, tribals and conservation agencies for protecting and restoring key ecosystems like wildlife corridors, grasslands, fringe agroforestry, food forests and buffer zones. For instance, buffer areas around Project Tiger reserves could be enrolled in biodiversity credit schemes,

allowing local communities to earn income through conservation-linked livelihoods rather than extractive practices like grazing or logging. These credits could also support rewilding, agroforestry, and eco-tourism in states like Madhya Pradesh, Karnataka, and Uttarakhand, where big cat populations remain vulnerable.

By mainstreaming biodiversity finance into the NBA and state biodiversity boards, India can establish a sustainable funding model for species recovery, habitat connectivity, and coexistence programmes. As India leads global dialogue on nature-centric solutions, Mission LiFE, biodiversity credits could become a powerful tool to align green economic growth with ecological restoration stewardship.

In Uganda, a biodiversity credit pilot was launched around Kibale National Park, a biodiversity hotspot known for its chimpanzees and rich tropical forests. Implemented by Wildlife Conservation International (WCI) in partnership with local communities, the project issues biocredits based on measurable outcomes such as species richness, ecosystem health, and habitat restoration. These credits are sold to investors and corporations aiming to meet nature-positive goals, and a significant portion of the proceeds is shared with local landowners and communities who commit to conservation. This model demonstrates how biocredits can complement carbon credits by focusing on biodiversity outcomes beyond carbon sequestration—protecting wildlife, supporting livelihoods, and restoring ecosystem integrity.

As the world prepares for the UN biodiversity finance negotiations at COP16, there is an urgent need to move beyond carbon markets and create strong financial mechanisms for biodiversity conservation. Biodiversity credits could be the next big breakthrough—a market-driven solution that rewards farmers, indigenous communities, and land stewards for their efforts in restoring ecosystems and preserving biodiversity-rich landscapes.

The world has placed a price on carbon, but now we must place a value on biodiversity. 🐾

Dr Chandrashekhar M Biradar is Earth System Scientist and Lead on Global Green Growth.

A mother and juvenile cheetah in the Savannah grasslands of Namibia

Photo: Corey Raffel



Cheetahs in Peril

Human expansion has led to dramatic loss of cheetah's historic range. In regions like the Horn of Africa, their demand as exotic pets, along with poaching for their pelts and body parts, has made their existence even more fragile

BY STIJN VERSCHUEREN & LAURIE MARKER

A cheetah is an evolutionary marvel. Its scientific name – *Acinonyx jubatus* – reflects unique adaptations. It is the only species in the genus *Acinonyx*, and its closest living relatives are the puma and jaguarundi, both native to the Americas. The second fastest land mammal, the pronghorn, inhabits North America, which further links the cheetah's evolutionary history to the continent.

The name *Acinonyx* derives from Greek, referring to the cheetah's semi-

retractable claws, a feature uncommon among most felids. These claws provide enhanced traction during high-speed chases, where they can reach speeds of up to 120 km/h in short bursts and accelerate from 0 to 100 km/h in just three seconds. The cheetah has a streamlined body, with a long, slender frame and a flexible spine that acts as a shock absorber during high-speed pursuits. Their large nasal cavities allow increased oxygen intake, and cheetahs have specialised fast-twitch muscle fibres for explosive sprints. The name *jubatus* comes from Latin and means crested. This refers to the mane or long neck fur of cubs. It is believed that cheetah cubs resemble honey badgers, fierce and aggressive creatures of the Savanna, potentially aiding in deterring predators.

Cheetahs' highly specialised adaptations make them perfectly suited to their grassland habitats. However, these traits come with trade-offs, including reduced physical strength compared to other large predators. As a result, cheetahs often seek refuge in areas where lions and spotted hyenas are absent, such as outside national parks, though this often brings them into conflict with people and their livestock.

Less than 7,000 adults left in the wild

Historically, cheetahs roamed across Africa, the Middle East, and parts of Asia, but they have now lost over 90% of their historic range. The International Union for Conservation of Nature (IUCN) lists cheetahs as Vulnerable, with fewer than 7,000 adult individuals left in the wild. Their populations are concentrated in eastern, southern, and northwestern Africa, and with a small, critically endangered Asiatic population remaining in Iran.

Habitat loss, driven by human expansion, agricultural development, and infrastructure projects, is fragmenting the cheetah's range and reducing the availability of suitable habitats. Retaliatory killings by farmers, who view cheetahs as a threat to their livestock, further exacerbate the situation, despite livestock predation by cheetahs being relatively rare. When such predation does occur, it often leads to increased conflict, threatening



Photo courtesy CCF

both cheetahs and local livelihoods. Habitat fragmentation isolates cheetah populations, diminishing genetic diversity and reducing their ability to adapt to changing environmental conditions.

Additionally, the illegal wildlife trade, particularly in the Horn of Africa (Djibouti, Eritrea, Ethiopia and Somalia) significantly contributes to their decline. The demand for cheetahs as exotic pets, along with poaching for their pelts and body parts, further jeopardizes their already fragile existence. These combined pressures

allowing cheetahs to move freely between habitats and reducing conflicts with human activities.

A cornerstone of cheetah conservation is community-based conservation, which empowers local people to actively participate in protecting their natural environment. This approach is vital for creating lasting change, as it builds local stewardship and fosters coexistence between people and wildlife. For cheetahs, involving local communities in conservation efforts helps to address

Compensation schemes for farmers whose livestock is lost in cheetah attacks can also ease tensions and support sustainable coexistence

require holistic conservation efforts and a collaborative species conservation plan to ensuring the future of the species.

Community Conservation, a Cornerstone

Effective conservation of cheetahs requires a comprehensive approach that addresses both immediate threats and long-term population sustainability. One of the core strategies is habitat restoration and the creation of wildlife corridors to connect fragmented populations, which is crucial for maintaining genetic diversity and facilitating natural movement across the landscape. Protected areas, buffer zones, and wildlife corridors are essential for

human-wildlife conflict, which is one of the most significant threats to the species. Educational programmes that raise awareness about the importance of cheetahs in maintaining ecosystem balance, as well as the economic value of ecotourism, can inspire communities to protect wildlife rather than view them as a threat. Community-led monitoring of wildlife populations, such as tracking cheetah sightings and incidents of human-cheetah conflict, can also contribute to valuable data collection for researchers while strengthening local ownership of conservation efforts.

Furthermore, conflict mitigation strategies, such as training farmers to use non-lethal methods to protect livestock, such as livestock guarding dogs or fencing,

The Cheetah Rescue and Conservation Center

in Somaliland is a sanctuary and rehabilitation centre for cheetahs rescued from the illegal wildlife trade and from conflicts with humans. Managed by the Cheetah Conservation Fund, CRCC serves as a rehabilitation site for over 100 sick and injured orphaned cheetah cubs. The centre, spread over 800 hectares, also includes education and vocational training facilities that benefit students, teachers, pastoralists, wildlife caregivers, eco-rangers, and local staff. There are plans to open it for public tours where visitors can learn about Somaliland's ecosystems and indigenous wildlife. The centre is envisioned as a regional hub for expertise and action in cheetah and broader biodiversity conservation. Through protected area development and supporting sustainable livelihoods, the illegal cheetah trade is tackled at its source. In the long term, rescued and rehabilitated cheetahs offer hope for rewilding and reintroduction efforts in the Horn of Africa and elsewhere.

can help reduce retaliatory killings. Compensation schemes for farmers whose livestock are predated upon by cheetahs can also ease tensions and support sustainable coexistence.

In addition to protecting existing habitats, translocation and reintroduction programmes can be vital tools for restoring cheetah populations in areas

Cheetah in Savannah grasslands



Photo: Corey Raffel

where they have disappeared or become locally extinct. A recent example is the reintroduction of cheetahs to India. Once native to the Indian subcontinent, cheetahs were declared extinct in India by the 1950s. In an ambitious effort to restore the species and its ecological role, India initiated a project to reintroduce cheetahs from southern Africa into Kuno National Park. This initiative follows earlier cheetah translocation efforts within the African continent, and is the first intercontinental attempt to re-establish a large carnivore in a region where the species went extinct.

Addis Ababa Declaration for Global Cheetah Conservation

In January 2024, the first Global Cheetah Summit in Addis Ababa highlighted the urgency of addressing the challenges facing cheetahs, whose populations have declined by over 90% in the last century. The summit, attended by more than 130 experts, resulted in the signing of the Addis Ababa Declaration for Global Cheetah Conservation.

The Declaration outlined a shared vision for scaling up collaborative, science-based conservation strategies. In particular, the Declaration identified the needs 1) to strengthen conservation engagement beyond conservationists, 2) to agree on range wide priorities and a collective strategic plan, and 3) to understand the resources needs and identify potential opportunities.

Cheetahs play a vital ecological role, maintaining healthy ecosystems, regulating prey populations, and preventing overgrazing. The success of the collaborative initiatives like Tigers Forever has shown how strategic conservation efforts can go a long way in protecting a species from extinction. Hopefully, a Cheetahs Forever model can be imagined to address threats to the species and increase its chances of long-term survival. 🐾

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All Ears

Found in India, South China and parts of Southeast Asia, the sambar (*Rusa unicolor*) forms the key prey base for apex predators like lions and tigers. Listed as a “vulnerable species” on the IUCN Red List, this deer has acute hearing senses. It can sense the presence of a predator faster and raise an alarm to warn others.

PHOTO BY SHIKHAR MOHAN

Shens of the Spiti Valley

TEXT AND PHOTOGRAPHS BY HARITRI GOSWAMI

A photograph of a snow leopard sitting in a snowy, mountainous landscape. The leopard is facing right, looking towards the horizon. Its fur is a mix of light tan and dark brown spots. The ground is covered in snow with some dry grass visible. The background shows more snow and some distant mountain peaks.

The snow leopard is an enigma of the high Himalayas, a creature of grace, power, and quiet resilience. I've been lucky enough to observe these rare cats in the Spiti Valley, Himachal Pradesh, they roam the rugged mountains, masters of their domain yet often unseen. In Spiti, the snow leopard is locally known as "shen", reflecting its deep cultural connection with the region. Known for its stealth and resilience, the shen is revered in local folklore and traditions, embodying the spirit of the rugged mountains.

Snow leopards are classified as Vulnerable on the IUCN Red List. Recent surveys have estimated the population in India, with around 718 in the wild. Of these, about 51 are believed to inhabit the Himachal Pradesh region.

One of the key protected areas for snow leopards in Himachal Pradesh is the Kibber Wildlife Sanctuary, located in the northern part of the state. Established in 1992, the sanctuary spans an area of over 2,220 sq km and provides a critical habitat for snow leopards and other wildlife, including the Himalayan ibex, blue sheep, and the Tibetan wolf. Kibber's rugged terrain, sparse vegetation, and high-altitude environment make it an ideal refuge for the snow leopard, allowing it to thrive in relative seclusion.

□ Snow leopards are built for the cold and rocky heights they call home. With thick fur to protect them from the freezing temperatures and a long, bushy tail to help them balance, they are perfectly made for harsh mountains



□ In the hunt for the elusive snow leopard, the people of Spiti have found their own way to live. Many work as guides, porters, or scanners, learning to live with the land and its challenges. Just like the creatures they protect, they have adapted to the cold, tough environment. Each job, each step they take, is a part of the rhythm of this wild, beautiful place

□ In the wild, snow leopards are known for their solitary nature, but young siblings often share a bond that can last for several months. These moments of connection are fleeting, before they part ways to establish their own territories





□ Key Monastery overlooks the Spiti Valley, a calm space for meditation and Buddhist learning. It's a living symbol of faith, where centuries-old traditions continue

□ Despite their fearsome reputation, snow leopards are solitary creatures. They prefer to roam alone, marking vast territories that can span over 100 sq km. Here, one of these solitary hunters takes a moment to rest





□ On a snow-covered slope, a pair of Himalayan ibex stand tall, their curved horns cutting through the mountain air. They are part of the snow leopard's world. The rocky terrain gives them some protection, but they are always aware of the silent hunter that waits in the shadows

□ A red fox trots through snow and cold winds that blow through Spiti. The fox, along with the Tibetan wolf, shares this land with the snow leopard. They too must adapt to the cold, and their lives are intertwined in the delicate balance of nature 🐾



FROM THE FIELD

Sundarbans Tigers

TEXT & PHOTOGRAPHS BY NIRMALAYA CHAKRABORTY



Tigers of Sundarbans have adapted to an amphibious lifestyle. They are incredible swimmers and are known to swim from one island to another with ease



□ With over 100 tigers in the Indian side alone, the Sundarbans continues to be one of the safest havens for the Royal Bengal tiger despite the challenging terrain

The Sundarbans is the largest deltaic region in the world, encompassing hundreds of islands along with a maze of innumerable rivers, rivulets, and creeks. The name ‘Sundarbans’ means “beautiful forest” and is derived from the mangrove tree species ‘Sundari’. It is the southern most part of the delta formed by the Ganges, Brahmaputra, and Meghna rivers, bordering the Bay of Bengal in India

and Bangladesh, and it covers 9,630 sq. km. Large portions of this area are designated as Ramsar Sites, wetlands of international importance, while the Indian side has been recognised as a UNESCO World Heritage Site since 1987. The Sundarbans ecosystem provides a wide range of vital ecological services, including cyclone protection for communities, a rich wildlife habitat, food security, natural resource provision, and carbon sequestration.



□ A chital (spotted deer) stretches up to take a bite of the fresh green leaves of the Sundari trees (mangrove trees native to coastal regions).

□ Bon Bibi is a revered forest goddess in the Sundarbans. She is a syncretic deity, venerated by all religions of this region, and is believed to protect those who enter the forest. Folklore holds that she is a guardian spirit, ensuring the safety of those who live and work in the Sunderbans





□ Fishing is one of the major economic activities of people living on the outskirts of the tiger reserve

□ Sundari trees have a unique root system adapted to their mangrove environment. They possess aerial roots that grow vertically upwards from the mud, allowing them to access oxygen when submerged. These 'breathing' roots are crucial for respiration in the oxygen-poor mud of the Sundarbans 🐾

Imagining Tigers in Shared Landscapes

India's success in recovering its tiger population has become a global conservation milestone. With numbers climbing from 1,706 in 2010 to an estimated 3,682 by 2022, this rebound is not without complications. As protected areas reach their carrying capacities, tigers are venturing into human-dominated landscapes such as villages, farms and even industrial zones, which is sparking fresh challenges.

At the 2025 Indian Regional Association for Landscape Ecology (IRALE) Conference, researchers, scientists and young minds explored a new vision of conservation that restores not only forests but also the balance between wildlife and human beings in shared landscapes. Part of an international association, IRALE nurtures the science of landscape ecology in India and neighbouring countries.

The setting of the conference near the Panna Tiger Reserve reflected a broader transformation in the discourse around

India's success in recovering tiger population in the wild has become a global conservation milestone

BY RAVINA YADAV

Researchers engaging in a poster presentation session at the Conference

conservation. From being occupied with saving tigers in national parks, the focus has shifted to understanding shifting to understanding how these big cats live, move and survive in shared landscapes. What unfolded through both the formal sessions and field interactions was a clearer picture of the shifting science, persistent challenges and emerging solutions shaping the future of big cat conservation.

Landscape Bigger Than Parks

Tigers are wide-ranging predators. A single adult male may require over 150 km² to sustain itself. With increasing numbers and limited space within protected areas, tigers are venturing into agricultural fields, buffer zones and degraded forests. This makes connectivity between forests critical. At IRALE, Shekhar Sarkar, a researcher from the Wildlife Institute of India (WII), highlighted how circuit theory modelling was used to map five key protected areas:

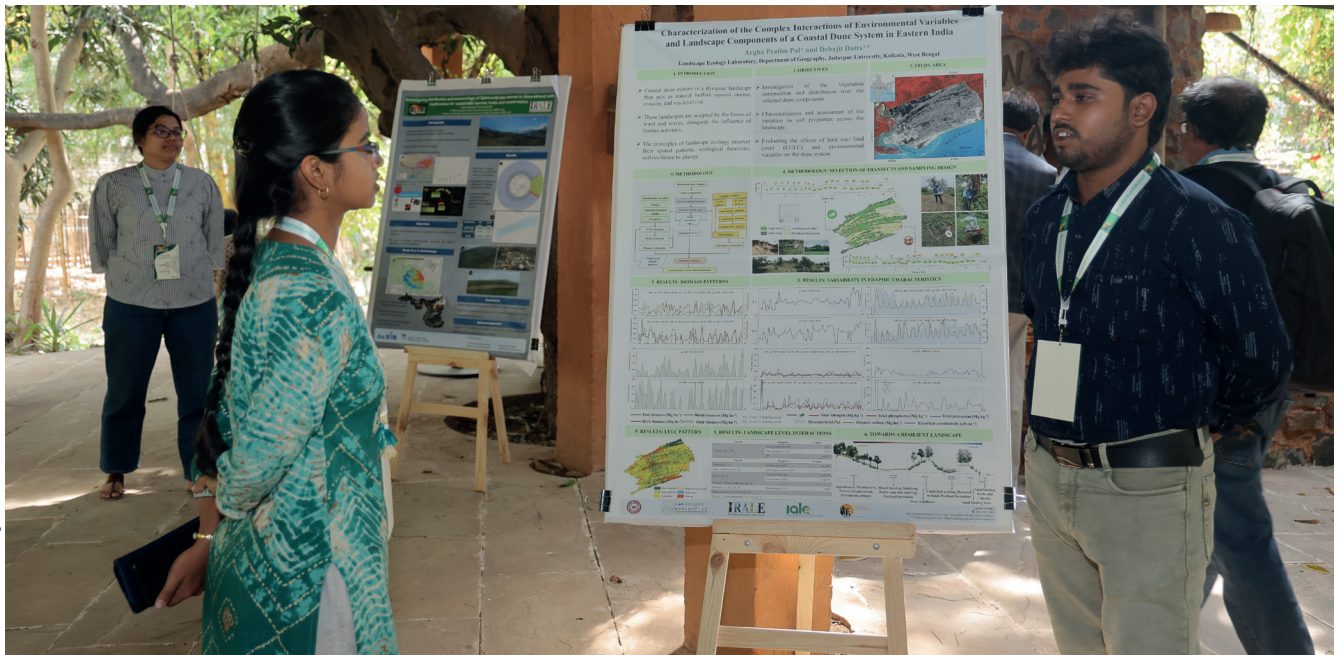


Photo courtesy IRALE



The remote hills and valleys of Melghat act as a safe haven for movement of wild animals in this region

Photo: Shikhar Mohan

Buxa, Jaldapara, Gorumara, Chapramari and Mahananda, along with their linking corridors. These corridors serve as ecological bridges, helping tigers disperse and maintain genetic flow.

This work reflects broader conservation planning across the country. The National Tiger Conservation Authority (NTCA) has identified 32 tiger corridors in India. These corridors play a vital role in ensuring landscape-level connectivity, especially in regions such as Central India, where the Kanha-Pench and Satpura-Melghat corridors facilitate movement across tiger reserves. Ongoing efforts to integrate conservation goals with development planning are crucial for maintaining these linkages and building a future where tigers and people can coexist.

Sharing Space

Tigers rarely exist in isolation. They share space with leopards, hyenas, jackals and people. PhD scholar Rajasekar Rajaraman's multi-species occupancy study at the Sanjay Tiger Reserve, discussed at IRALE, revealed that tigers were found in fewer areas across the landscape compared to their counterparts. Leopards were observed in nearly half of the surveyed zones, while hyenas were present in about one-third. Each species selected habitats based on tiger presence and human proximity. For

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The species recovery is not the finish line. True conservation requires ensuring that big cats have enough room to roam and communities willing to coexist with them
”

instance, hyenas were more common near villages, likely attracted to livestock carcasses and food waste.

What this means is that managing tigers also requires understanding how other carnivores adapt or compete. Such insights can inform better spatial zoning and reduce the chances of conflict, both among species and with humans.

Building Future Stewards Youth engagement was a major focus at the conference. Poster sessions, workshops and an educational visit to the Panna Tiger Reserve provided students with opportunities to share ideas, learn from field experiences and engage with scientists. Their involvement highlighted the importance of building ecological awareness and practical skills among the next generation of conservationists.

Rethinking Conservation

Panna itself tells a powerful story. The tiger population dwindled to nearly none in 2009, yet it now hosts a thriving population of over 50 individuals, thanks to a reintroduction programme that combined science, management, and community support. Still, Panna is a reminder that recovery is not the finish line. True conservation requires ensuring that big cats have room to roam and societies willing to make space for them.

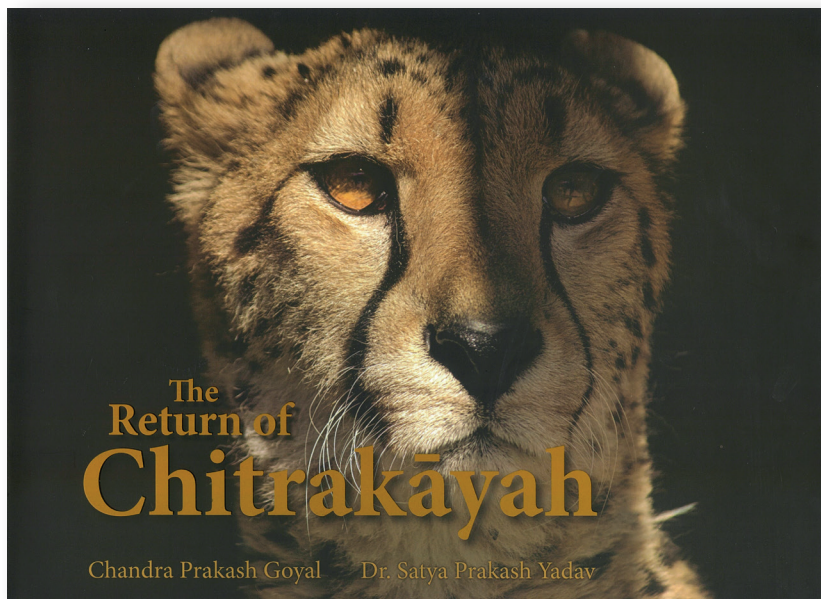
That is why IRALE's 2025 declarations are not just procedural. They reflect a deeper shift in approach. First, by expanding focus to both rural and urban landscapes, IRALE acknowledges that conservation must be inclusive of human settlements, not isolated from them. Second, the focus on youth engagement, especially school and college students, aims to build long-term resilience in conservation leadership. Finally, by initiating a government-NGO collaboration for an elephant management project in Central India, IRALE is committing to multi-species, multi-stakeholder landscape governance, an approach just as vital for tigers as for elephants.

In the years to come, India's big cats will walk paths that cross highways, farms and forest edges. If we hope to hear their roar in the future, we must learn not only to protect their spaces but also to rethink our own. 🐾

Ravina Yadav is staff writer for BigCats magazine.

The Return of Chitrakāyah

BY SHIKHAR MOHAN



“

A project of humongous scale and magnitude is bound to throw unforeseen challenges. The complexity of life, species and natural systems makes science inherently uncertain, and no amount of planning can control chance events, for life and death are a part of nature. There lies the pain and also resilience.

—Chandra Prakash Goyal and Dr Satya Prakash Yadav

The Return of Chitrakayah is an exhaustive account of the long and arduous journey of bringing the fastest land mammal back to Indian soil after almost seven decades of local extinction. Told by two of India's most experienced wildlife conservationists and forest officers, Mr Chandra Prakash Goyal and Dr Satya Prakash Yadav, this aesthetically presented book highlights various aspects of the world's first transcontinental wild-to-wild, large carnivore translocation project.

India has a long history of conservation. Several stories of preserving and protecting forests and wildlife are part of traditional folklore. After independence, a series of conservation attempts have been made to save from extinction species like the Asiatic lion to the Royal Bengal tiger, from the

great Indian bustard to the vultures.

The cheetah was wiped off the wildlife map shortly after India gained its independence in 1947. This visual book starts by describing the historical importance of this elegant big cat and how intricately connected it is with our heritage. From the depictions of the cheetah in prehistoric cave paintings to the 'coursing' of this royal carnivore to hunt antelopes by the kings and princes of yesteryear to bounty hunting during the colonial reign, the book takes the reader through a visual treat. It then focuses on the crucial year of 2009, when the Indian government started to contemplate the possibility of reintroducing the cheetah in the wild.

The discussions began in September 2009 at a two-day conference between the then Ministry of Environment and Forest officials and 30 well-known cheetah experts from across the globe, like Dr Laurie Marker (American zoologist, researcher, author, educator, and founder of the Cheetah Conservation Fund who later supervised the translocation exercise) and Dr Stephen O'Brien (American geneticist and ex-Chairman of the Board of the Cheetah Conservation Fund), leading to a decision to survey potential sites and a subsequent action plan for the project.

Finally, after 13 long years of seemingly never-ending diplomatic, scientific and legal labour, it was in September 2022 that the first cheetahs landed in the city of Gwalior on board a modified Boeing 747 aircraft. The Indian Prime Minister Narendra Modi then released the five female and three male Namibian cheetahs in Kuno National Park of Madhya Pradesh, some 150 km away from the airport, on 17 September 2022.



An adult cheetah at the
Kuno National Park,
Madhya Pradesh

Photo courtesy Kuno National Park

“

The grasslands and open scrub-thorn forests were marked as wastelands and mostly converted into croplands or used for commercial ventures.

Bringing the Cheetah back into the wild can help conserve the endangered grasslands that form prime Cheetah habitat and support various other endangered species such as the caracal, wolf and bustard.

—Chandra Prakash Goyal and Dr Satya Prakash Yadav

The second half of the book is a fascinating record of what the cheetahs are like. As the book dives into the mysterious and intriguing world of these big cats, we get to learn about the battle between the Rockstars (named Elton and Freddie) and the Whitewalkers (cheetahs named Vayu and Agni). We learn about Pawan, a male Namibian cheetah in his prime, who while exploring Kuno National Park, wandered into village fields before moving to another national park. In another fascinating tale, we are told about how one fateful night, the team tracking a female Namibian cheetah named Aasha was attacked by local villagers after they were mistakenly considered dacoits. Each day is a struggle and an adventure for both

the cheetahs as well as the teams looking after them, and this is arguably the most fascinating segment of the book.

Highlighting the project's multifaceted dimensions and weaving nicely between scientific inquiry, ecological restoration, socio-economic considerations, and cultural sensitivities, the book is an ode to an incredible milestone in India's nature conservation timeline. It manages to tell a long and complex story in a very simple and gripping manner, complemented by some stunning photographs. **The Return of Chitrakayah** is a worthy addition to every wildlife enthusiast's collection. 🐾

Shikhar Mohan is photo editor for BigCats magazine.

Photo courtesy Colossal Biosciences



Extracting the dire wolf DNA from petrous bone

Extinct Dire Wolf

Wildlife world is rife with debate over the stunning revival of the dire wolf, extinct for over 10,000 years. US-based scientists have genetically re-engineered traits from ancient DNA into modern grey wolves, resulting in three snow-coated pups: Romulus, Remus, and Khaleesi. At just six months old, they already weigh 80 pounds and exhibit wild, instinct-driven behaviour, avoiding human contact and responding keenly to environmental cues.

Beyond resurrection, the project claims to extend. Scientists have cloned four endangered red wolves, aiming to restore balance in ecosystems altered by human activity. Critics, however, warn of ethical concerns, ecological risks, and the unpredictable outcomes of releasing such animals.

Proponents argue the work is a necessary step in reversing human-driven extinctions. With plans to engineer a woolly mammoth hybrid by 2028, the project signals a transformative moment in conservation science. Whether this

bold approach brings balance or chaos remains a fiercely contested question.

Read more: <https://colossal.com/direwolf/science/>

No Prey, No Lions

A new study has revealed a critical link between the decline of African lion populations and the dwindling

numbers of their herbivore prey. This research, published in Conservation Science and Practice, emphasises that protecting prey species is essential to reversing the decline of these iconic big cats.

Researchers found that the decrease in animals like wildebeests and zebras, largely due to poaching for bushmeat, has a direct negative impact on lion populations. The study monitored 358 lions for over four years in the Greater Kafue Ecosystem (GKE), a vast 60,000 km² conservation landscape in Zambia, and showed a clear correlation between prey availability and lion population health.

The findings highlight a significant difference in

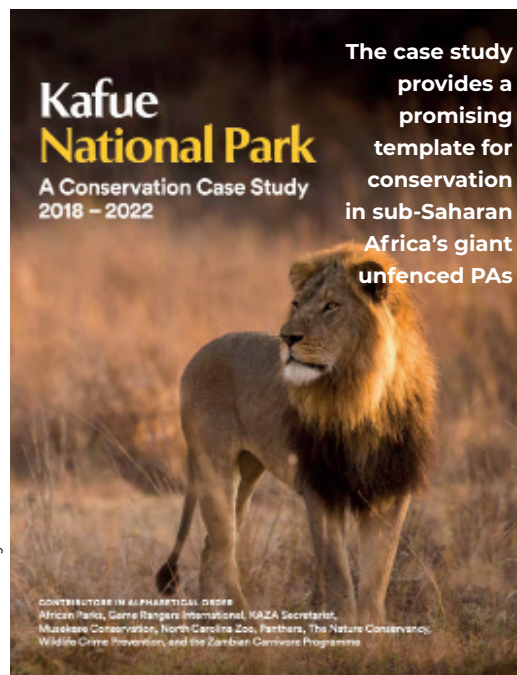
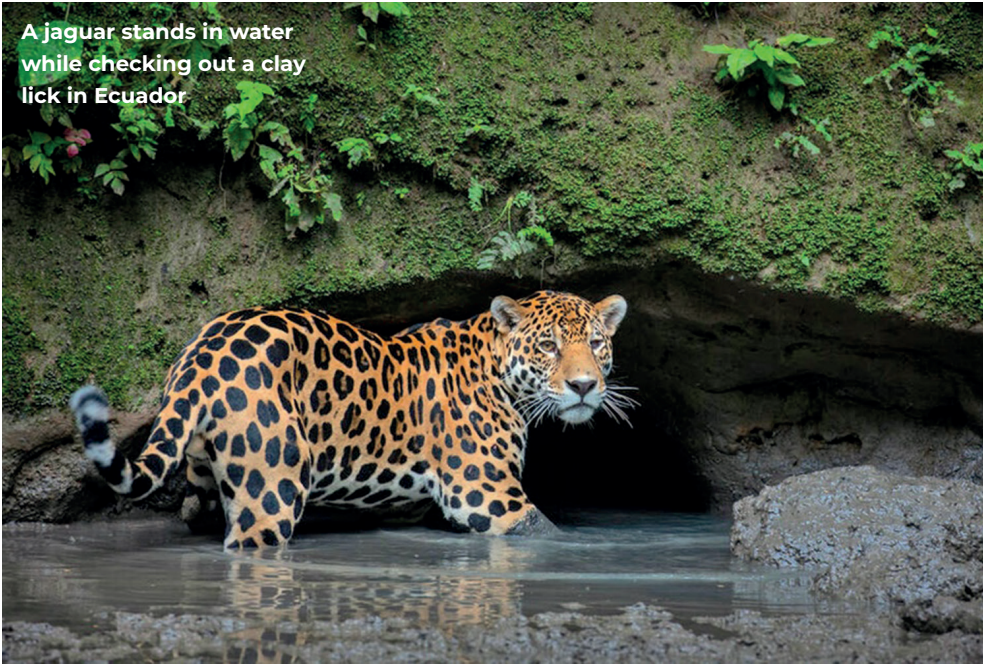


Photo courtesy Panthera

A jaguar stands in water while checking out a clay lick in Ecuador



management, and offer professional training. This initiative follows previous health crises, including the 2018 Asiatic lion epidemic in Gir, which caused 24 lion deaths, and the 2019 avian botulism outbreak that killed 18,000 migratory birds.

Launched in 2020, Project Lion aims to protect the Asiatic lion population, which now numbers 674, according to the 2020 census. These lions are distributed across 53 talukas in nine districts, spanning nearly 30,000 sq km of Gujarat. Key efforts also involve establishing high-tech monitoring centres, veterinary hospitals, and community-driven conservation programs.

lion population growth rates in GKE depending on the protection levels afforded to prey animals. According to the study, areas with high protection saw a much greater probability of lion population growth (89.3%) compared to areas with low protection (30.2%).

Read more here: https://panthera.org/sites/default/files/case-studies/CaseStudy_KafueNationalPark.pdf

Jaguars Survive on Trees During Floods

A study conducted by the Mamirauá Institute has revealed a remarkable adaptation trait among Amazon jaguars (*Panthera onca*). Instead of migrating to dry land during the seasonal flooding of the Mamirauá Sustainable Development Reserve in Brazil, these big cats take to the trees, where they hunt, rest, and even reproduce.

However, biologists warn that climate change and altered flood cycles may threaten this unique adaptation. Extreme droughts and unpredictable flooding patterns in the Amazon, influenced by global warming and El Niño events, could disrupt the jaguars' delicate ecosystem.

The study, which tracked 14

jaguars using GPS collars between 2011 and 2020, showed that their home range remained unchanged during the floods. This discovery challenges previous assumptions that the animals, such as tapirs and wild pigs, would follow their prey to drier regions. Instead, researchers observed jaguars hunting tree-dwelling prey like monkeys and sloths while conserving energy by resting on branches.

This research underscores the importance of conservation efforts to protect jaguars and their habitat in an ever-changing climate.

Read more: <http://dx.doi.org/10.1093/jmammal/g yae145>

India's ₹2.9K Crore Boost for Lion Conservation

The Union Government has approved ₹2,927.71 crore for Project Lion, focusing on the conservation of Asiatic lions and the creation of a National Referral Centre for Wildlife (NRC-W) in Gujarat. The new facility in Junagadh's New Pipaliya will strengthen wildlife disease surveillance, especially zoonotic diseases that could impact humans.

The NRC-W will track emerging diseases, support wildlife health

A Study on What Impacts Mammal Survival

A new study published in Nature challenges the notion that protected areas are sufficient to shield mammal populations from human impact. Researchers analysed extensive data on mammal species and found that human activities significantly affect these populations, even within protected zones.

The study reveals that habitat destruction, hunting, and infrastructure development extend their influence beyond protected area boundaries, impacting mammal survival. This highlights the limitations of relying solely on protected areas for conservation.

The authors emphasise the need for a more integrated conservation approach. They advocate for combining protected areas with strategies that address human activities in the surrounding landscapes. This involves managing human impacts across broader ecosystems to ensure the long-term viability of mammal populations.

Read more here: <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3002976>

Photo courtesy IRALE

Researchers at the 2025 IRALE Conference



IBCA Hosts Special Session on Big Cats at IRALE 2025

The International Big Cats Alliance (IBCA) co-hosted a special session on Big Cats Landscape Conservation at the International Restoration and Landscape Ecology (IRALE) Conference 2025, held between 26-28 February, in Madla, Madhya Pradesh, central India. Moderated by IBCA's Dr Tamali Mondal, Programme Associate at IBCA, the session brought together leading experts to share insights and strategies for the conservation of big cats across the globe.

Dr Kausik Banerjee, Lead Specialist at the IBCA, opened the session with an overview of the status and threats facing seven major big cat species worldwide. He stressed that landscape management is an essential component of effective big cat conservation strategies.

Dr K Sankar, Former Director of the Sálím Ali Centre for Ornithology and Natural History (SACON), presented a comprehensive overview of the evolution of active big cat management in India, with a particular focus on the conservation success stories of the Sariska and Panna Tiger Reserves.

Mr Uttam Sharma, Field Director of Kuno National Park, offered exclusive insights into India's landmark Cheetah Introduction Programme. He spoke about the challenges faced, the achievements so far, and the future plans for this pioneering conservation effort.

Adding a global perspective, Dr Yashveer Bhatnagar, Country Representative, IUCN, along with Dr Dennis Ikanda, African Lion Specialist at IBCA and Wildlife Expert at WWF-Tanzania, reflected on India's successful big cat conservation initiatives. Both speakers highlighted the critical need for collaborative efforts and greater support

for small-scale conservation projects. They also emphasised IBCA's pivotal role in building capacity for big cat protection worldwide.

The session concluded with closing remarks delivered virtually by IBCA Director General Dr S P Yadav. He emphasised that big cats symbolise 'Big Opportunities' for biodiversity conservation, ecosystem service provision, climate change mitigation, sustainable eco-tourism, livelihood security, and the preservation of natural heritage for future generations, ultimately benefiting humankind at large.



Panel discussions in the conference on Action for Biodiversity Conservation

Meet on Action for Biodiversity, Investing in People & Planet

The IBCA, in collaboration with the Confederation of Indian Industry (CII), organised a conference on 'Action for Biodiversity Conservation: Investing in People and Planet' on 3 March 2025 in Mumbai. The conference was attended by representatives from corporates, public sector units, government officials, and civil society organisations. The discussions were highly productive, fostering new

collaborations between corporates and the IBCA.

The IBCA looks forward to advancing corporate sustainability initiatives, enhancing biodiversity financing, and promoting nature-based solutions to strengthen big cat conservation efforts in the years ahead.

International Conference on Snow Leopard Conservation

At the International Conference on 'Study and Conservation of Snow Leopard in the World: Joining Efforts,' organised by the Russian Federation and the Government of the Republic of Tatarstan in Kazan, Russia, Dr S P Yadav, Director General of IBCA, spoke on the protocol for snow leopard assessment. He highlighted IBCA's role in assisting range countries in the conservation of snow leopards and other big cat species.

During the visit, Dr Yadav also held a fruitful meeting with Mr Rustam Minnikhanov, Honourable President of the Republic of Tatarstan, Russian Federation, in Kazan. They discussed IBCA's contributions to big cat conservation and explored opportunities for cooperation, particularly in capacity building for frontline staff, researchers, and conservationists.

Headquarters Agreement between Government of India and IBCA

The Government of India and the IBCA signed the Headquarters Agreement on 17 April 2025. The agreement was signed by External Affairs Secretary (East), Mr P Kumaran, and Director General of IBCA, Dr S P Yadav. Under the agreement, India will host the IBCA Headquarters and Secretariat. The Government of India has committed budgetary support of roughly 18.07 million USD to IBCA for the creation of a corpus, development of infrastructure, and coverage of recurring expenses for a period of five years, from 2023-24 to 2028-29.

Cambodia & Guinea new members of IBCA

The IBCA's global network continues to grow, with Cambodia and Guinea joining as new member countries in April 2025. With their addition, IBCA now has a total of seven member countries.

Countries with Lion as National Animal



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Hidden Treasures India's Heritage in Tiger Reserves Volume I

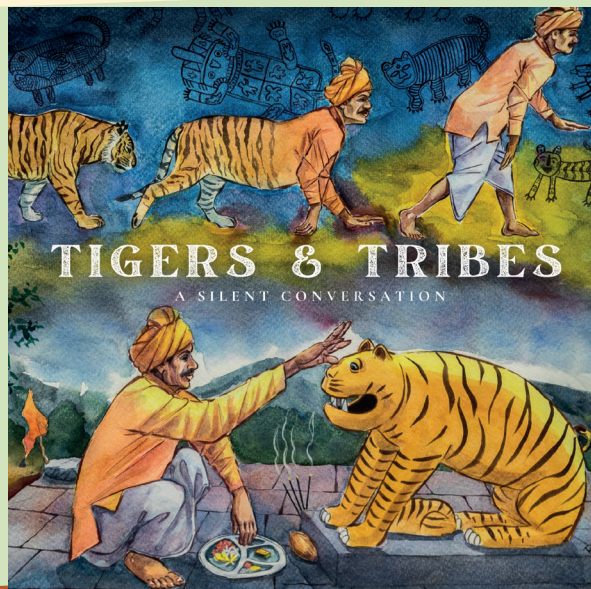
Exploration of the unknown gems of India's tiger reserves - revealing quaint shrines, ancient relics, temples, and remnants of royal residences that stand as living links to history.

Tigers & Tribes A Silent Conversation

Inspired by the tribal art exhibition, 'Silent Conversation: From Margins to the Centre,' this book celebrates the intricate bond between tigers and the tribal communities living in and around India's tiger reserves.



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Big Cats

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CHEETAH



JAGUAR



LEOPARD



LION



PUMA



SNOW LEOPARD



TIGER