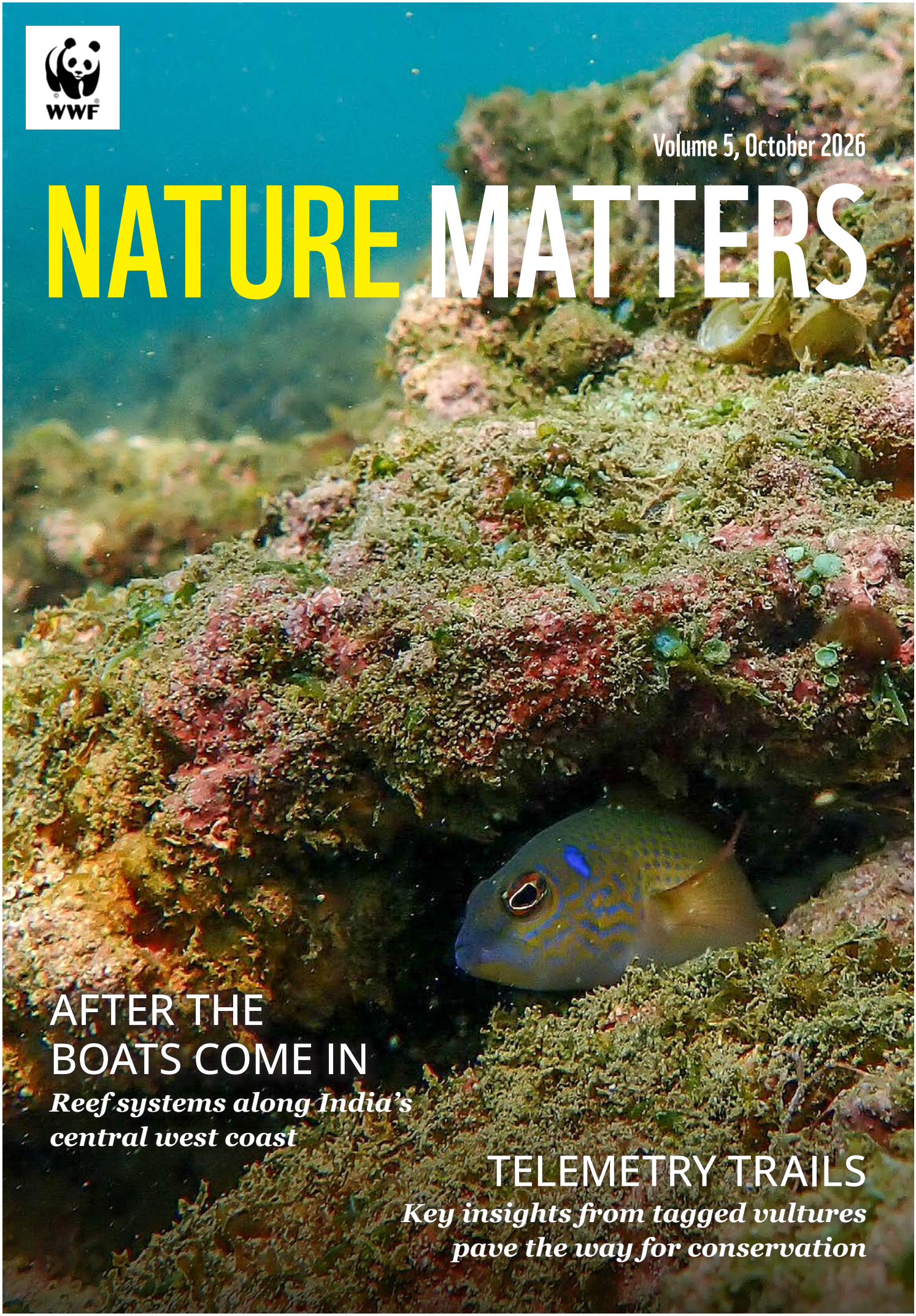


Volume 5, October 2026

NATURE MATTERS

AFTER THE BOATS COME IN

Reef systems along India's central west coast

TELEMETRY TRAILS

Key insights from tagged vultures pave the way for conservation

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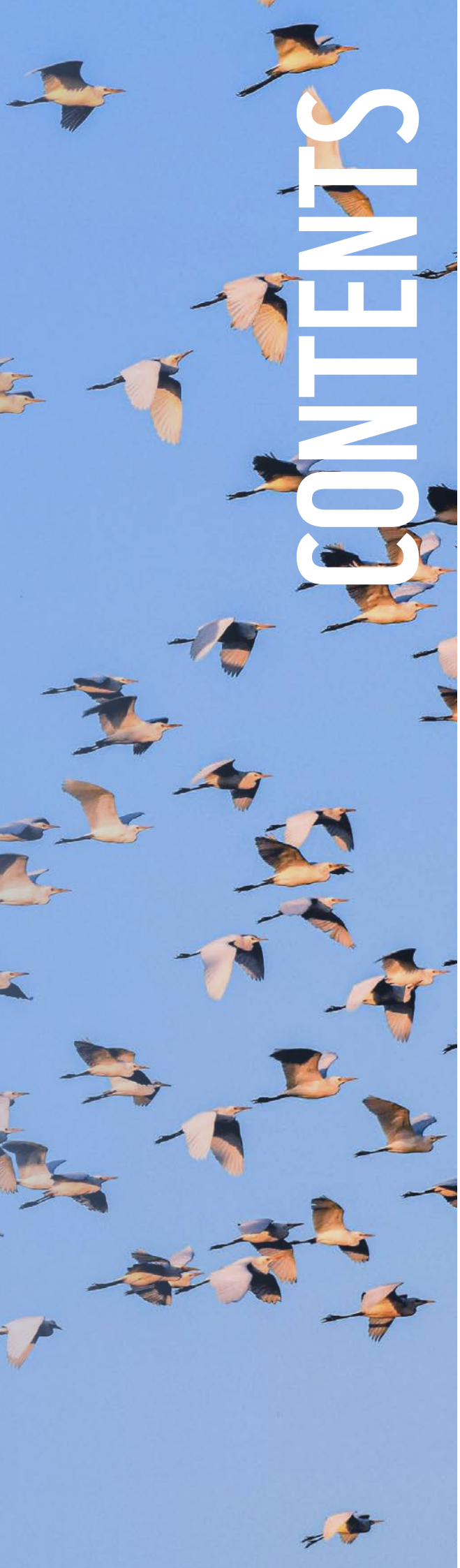
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FROM THE EDITOR'S DESK

Dear Readers,

Welcome to Volume 5 of Nature Matters—WWF-India's bulletin capturing stories and insights from its conservation work across India. This Volume highlights personal experiences, collaboration, innovation, and science at the heart of our efforts.

Telemetry trails follows a satellite-tagged Eurasian griffon on a 12,000-kilometre journey from Madhya Pradesh to Kazakhstan and back, revealing stopover sites and threats like powerlines, and other critical insights for enabling targeted conservation action.

Along India's central west coast, the story of reef life is unfolding through early morning fish landings, underwater dives, and the lived knowledge of fishers who know these waters best. Together, these human and scientific perspectives are revealing the hidden rhythms of reef ecosystems (*After the boats come in*).

Restoring the Arkavathy is a shared experience of how wetland restoration in Karnataka is reviving ecosystems, improving water security, and building community resilience through collective action.

In Marrivanipalli, Telangana, a community-led "fruit forest" is helping reduce crop raiding by monkeys, restoring biodiversity, improving soil and water health, and offering a scalable model for regenerative, nature-based agriculture (*A 'fruit forest' of change*).

This Volume of Nature Matters also reveals fresh sightings of elusive species—the fishing cat in Rajasthan's Mukundra Hills Tiger Reserve (*Hope in hiding*) and the Pallas's cat in Arunachal Pradesh (*Shangku – the old man of the mountains*).

'*Driving a sustainable future for India's steel industry*' highlights the shift to green steel through the India Green Steel Coalition, showing how industrial growth can align with climate responsibility.

In Telangana's Kawal Tiger Reserve, Hunter, a trained wildlife sniffer dog, is tracking illegal teak and wildlife poaching cases, demonstrating the growing impact of sniffer dogs in wildlife law enforcement (*Hunter on the trail*).

In Tamil Nadu's Sathyamangalam Tiger Reserve, a community initiative converts invasive lantana into eco-friendly briquettes, generating livelihoods, reducing human-wildlife conflict, and building trust for inclusive forest restoration (*Roots of renewal*).

And, Manju Devi, a *Bagh Mitra* in Pilibhit, shares her journey of leading her community in safely coexisting with tigers, showing how awareness, vigilance, and timely action can protect both people and wildlife.

Hope you find this Volume of Nature Matters an inspiring and informative read.

Regards

Sejal Worah
Programme Director
WWF-India

CONSERVATION INSIGHTS



© Dr Kaushik Ghosh

01

WWF–IKEA renew their partnership to advance resilient agricultural landscapes in India

WWF-India and IKEA have renewed their long standing global partnership through 2030, reinforcing their commitment to climate-smart, wildlife-friendly agriculture in India. Building on over 23 years of collaboration, the partnership has supported thousands of cotton farmers in adopting regenerative practices that improve soil health, reduce emissions and enhance biodiversity. The next phase will scale landscape level solutions integrating biodiversity conservation, water stewardship and sustainable livelihoods across key agricultural regions.

02

Four rhinos released at Dudhwa Tiger Reserve



© WWF-India

Four greater one-horned rhinos were successfully translocated within the Dudhwa Tiger Reserve on 23-24 March 2026, marking an important milestone in conservation efforts. With support from WWF-India, the Uttar Pradesh Forest Department released one male and three females aged between 15 to 25 years from the 27-square-kilometre fenced rehabilitation zone into suitable grassland habitat within the reserve's core area. With this, the total number of rhinos which are now free ranging in Dudhwa has increased to eight, giving a major push to rhino conservation efforts in India's Terai region, as also highlighted in the existing National Rhino Conservation Strategy.

The forest department, in collaboration with WWF-India and wildlife experts, has been closely monitoring the rhinos' health and behaviour. Initial observations indicate that the animals are adapting well to their natural surroundings. Lessons learned from the previous translocation phases, along with encouraging outcomes, played a crucial role in the success of this operation. A dedicated monitoring system and control room have also been established to track the rhinos.



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03

Celebrating World Wetlands Day 2026

World Wetlands Day is observed annually to mark the adoption of the Ramsar Convention and to reaffirm the importance of wetlands for biodiversity, water security and livelihoods. The 2026 theme, *Wetlands and Traditional Knowledge: Celebrating Cultural Heritage*, recognised wetlands as living cultural landscapes shaped by longstanding human–nature relationships, while calling for stronger integration of traditional practices with science-based conservation approaches. WWF-India marked the day with a nationwide programme of engagement, organising workshops, awareness drives, nature trails and bird watching activities across six states—Madhya Pradesh, Uttar Pradesh, Uttarakhand, Karnataka, Tamil Nadu, Punjab and Rajasthan. The outreach included programmes at schools and colleges through art and essay competitions, encouraging students to reflect on wetland conservation creatively. The events also saw participation from respective state government departments, district administrations and panchayat level stakeholders. In total, 26 events engaged over 2,000 students and 500 community members. The events also attracted over 1,000 visitors who learned about wetland conservation and the various initiatives to promote it.

As part of the national event organised by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and the Department of Forests and Wildlife, Government of National Capital Territory of Delhi, WWF-India also participated in the World Wetlands Day celebrations at Asola Bhatti Wildlife Sanctuary, Delhi, as a knowledge partner to the MoEF&CC. The engagement included a curated exhibition on WWF-India's wetland conservation work and a moderated interaction with wetland mitras—community volunteers engaged in wetland conservation—highlighting the value of community stewardship in wetland management.

04

Mangrove Mitras: A citizen science initiative launched in Mumbai



© WWF-India

In a step towards building urban climate resilience, the Mangrove Mitras initiative was launched in Mumbai on 26 July 2025, on the International Day for the Conservation of the Mangrove Ecosystem, by WWF-India in collaboration with the Mangrove Cell and the Mangrove Foundation of Maharashtra, under the aegis of the newly established Mangrove Coalition. This citizen science initiative aims to mobilise multiple stakeholders, including urban citizens and local communities, to engage constructively in the conservation of mangroves. This could help to rebuild a people-wetland-river-mangrove connect through an immersive experience on the magical value of mangroves and inspire them to be the stewards of these ecosystems. Since its launch, the initiative has registered 182 Mangrove Mitras and conducted 31 engagement programmes, including field surveys, Wetland Health Card (WHC) surveys, NGO interactions, fishermen interactions, Coastal Nature Club (CNC) activities, and initial orientation sessions across 13 colleges.



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05

Tiger translocated to Rajaji Tiger Reserve to support species recovery

In an effort to supplement the recovery of the tiger population in the western part of Rajaji Tiger Reserve, an adult male tiger was translocated from Corbett Tiger Reserve to the western side of Rajaji in May 2025 by the Uttarakhand Forest Department in collaboration with the National Tiger Conservation Authority (NTCA), the Wildlife Institute of India (WII) and WWF-India. With this, the total number of tigers translocated to Rajaji over the last five years rose to five. Before the translocations, tigers occupied less than 20% of the habitat in the western part of the Rajaji Tiger Reserve, with photographic evidence establishing the presence of just two females and no signs of breeding since 2006. Therefore, tiger translocation was considered a necessary step towards species recovery. As the tiger population grows, it is likely that tigers will disperse out of the western Rajaji Tiger Reserve into the surrounding landscape, including protected areas and reserve forests in nearby Uttar Pradesh, Himachal Pradesh and Haryana, thus expanding the species' distribution into productive areas of its historic range.

06

Building people-nature partnerships

WWF-India organised a four-day training and review meeting in Bhubaneswar, Odisha, from 5–8 February 2026 under the Department of Science and Technology, Government of India supported People and Protected Areas Programme (Phase III). Fourteen NGO partners from across the country participated in the meeting, which focused on reviewing partners' workplans and strengthening capacities to adopt relevant technologies for livelihood augmentation.



© WWF-India

Participants visited the ICAR–Centre for Women in Agriculture, ICAR–Indian Institute of Water Management, ICAR–Central Institute of Freshwater Aquaculture, and Krishi Vigyan Kendra to learn about scalable rural technologies in agriculture, horticulture, fisheries, and water management. Training sessions were also conducted on biodiversity monitoring tools and on abating wildlife crime, with a specific focus on the role that NGOs and local communities can play. Participants further discussed ways to strengthen local institutions for conservation and livelihood generation.

The programme concluded with a field visit to the Mangalajodi ecotourism site at Chilika Lake, where participants learned about community-based tourism and opportunities based on nature like bird watching.



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07

Curbing trafficking of exotic reptiles in India

WWF-India has published and circulated a new identification poster on commonly trafficked exotic reptiles to support wildlife law enforcement agencies such as the police, paramilitary forces, the Wildlife Crime Control Bureau, state forest departments and others in detecting and curbing their illegal trade. Titled—*Reptiles in Illegal Wildlife Trade in India*—the poster provides an illustrative compilation of frequently trafficked species—including iguanas, tegu lizards, pythons and skinks—that are smuggled into and within India despite regulatory provisions under the Wild Life (Protection) Amendment Act, 2022, and CITES. For a copy of the poster, please write to us at wildlifetradecontrol@wwfindia.net.

08

The Peacock's Call: Mission LiFE (Lifestyle for Environment) for a Greener Tomorrow



© WWF-India

WWF-India, in collaboration with the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, organised a three day awareness event and exhibition on the cultural and ecological significance of the Indian peafowl. Held at Travancore House in New Delhi, the event titled, *The Peacock's Call: Mission LiFE (Lifestyle for Environment) for a Greener Tomorrow*, highlighted sustainable lifestyles and biodiversity conservation through artistic interpretations rooted in India's age old traditions. The exhibition brought together art curators, students and senior government officials who shared perspectives on promoting awareness and conservation of urban bird species, particularly the Indian peafowl, for a healthier environment. During the event, MoEF&CC also recognised WWF-India's Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP) as the best environmental awareness programme in India.

COVER

TELEMETRY TRAILS

Key insights from tagged vultures pave the way for conservation

By Ratul Saha and Rinkita Gurav



In March 2025, forest officials in Satna, Madhya Pradesh, rescued an exhausted Eurasian griffon (*Gyps fulvus*), one of the many migratory vulture species that pass through India each winter. These birds travel extraordinary distances by circling on rising thermal air currents and then gliding for long hours with minimal effort.

The rescued bird showed signs of dehydration and a poor appetite. It was treated with fluids and nutritional supplements before its release on 29 March 2025. However, this release was different. The vulture was fitted with a lightweight satellite telemetry tag by WWF-India and the Madhya Pradesh Forest Department, marking the start of a journey that would cross international borders and reveal critical insights into the migratory ecology of raptors, which are crucial to India's conservation planning, infrastructure choices, and ecological diplomacy.

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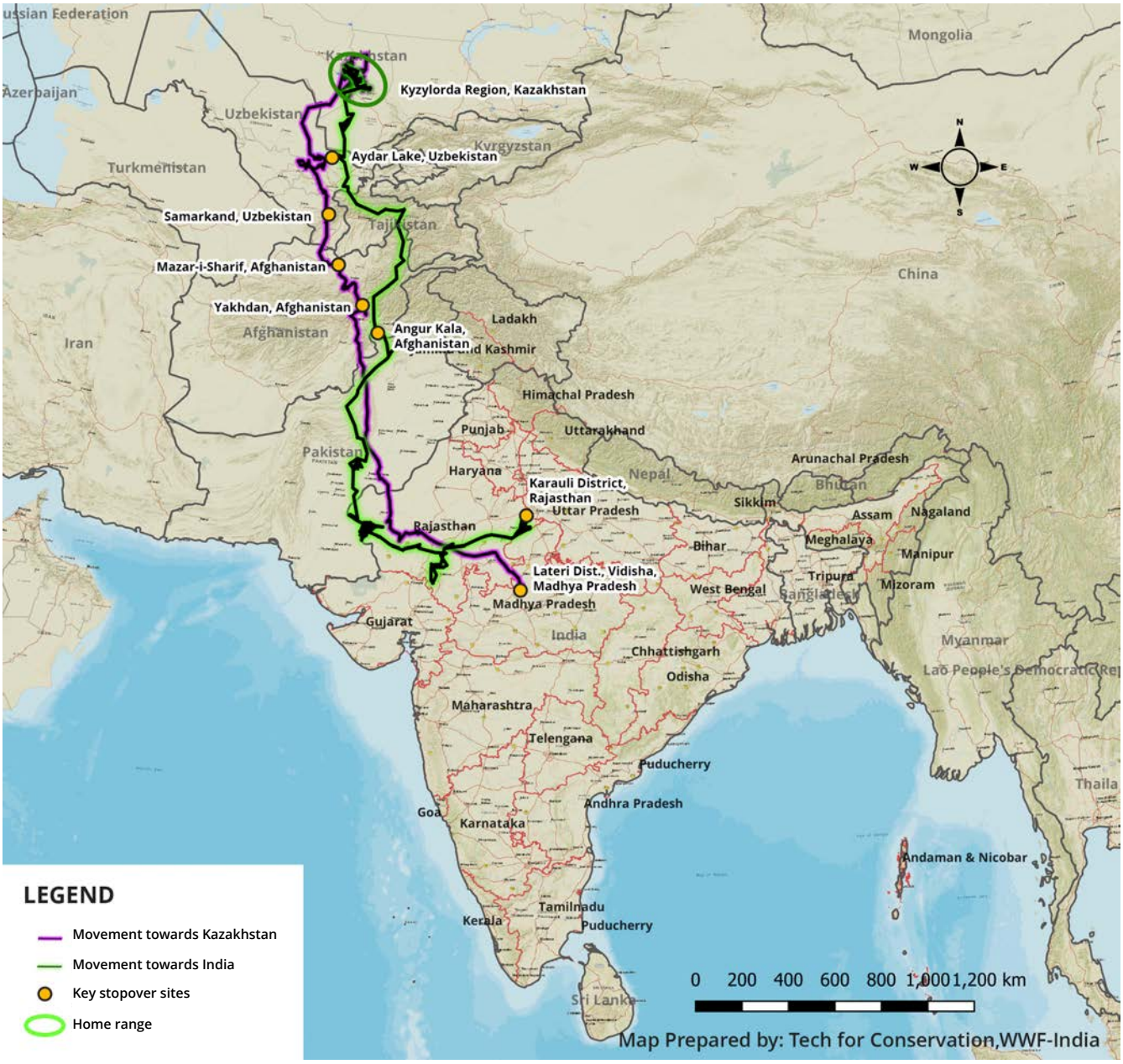
An incredible journey

Within 44 days of its release, the tagged vulture had flown more than 6,000 kilometres, crossing Pakistan, Afghanistan, Tajikistan, Uzbekistan, Kyrgyzstan and finally arriving in Kazakhstan. Its brief stopovers at places like Mazar-i-Sharif, Samarkand and the wetlands around Aydar Lake were more than just rest points. These were critical staging areas that sustain long distance migratory raptors, acting as ecological waystations that fuel and support their long journey along flyways. By November 2025, the bird was already on its way back south—covering thousands of kilometres in barely three weeks and returning to Madhya Pradesh in India.

TAGGING EXERCISE

Tagging even a single vulture requires approximately 30 to 45 days of field preparation, which includes tracking local movements, identifying safe capture windows, and assembling a team of trained veterinarians and handlers. Once captured, the tag is fitted in under fifteen minutes, and the bird is released after a full health check. Each tagged bird provides thousands of GPS fixes over many months, along with high-quality data that ground surveys cannot.

These datasets help connect the pieces of a much larger picture—one that links migration, local landscapes, infrastructure, and governance into a single, actionable narrative.



Movement map of the tagged Eurasian griffon as of January 2026

Stopover sites matter

As the tagged Eurasian griffon coursed across mountains, deserts, and river flood plains, its path revealed how migratory birds depend on a network of stopover habitats—each serving a different purpose, much like the places we rely on during long travels.

One of the clearest indicators of these purposes is the duration of a bird's stay at each site. Duration reflects the energy gained, the conditions encountered, and the ecological role that particular stopover site plays.

• **Fire escapes:** These are small, isolated patches of land where a bird can quickly drop in when the weather turns hostile, or its energy dips dangerously low. They are rarely used, but when they are, they become the thin line between survival and collapse. Examples of fire escape sites in the world include islands in the Gulf of Mexico (e.g. Dauphin Island, Alabama; Dry Tortugas, Florida) and unforested islands or tips of peninsulas in or along the Great Lakes (e.g. Long Point, Ontario).

• **Convenience stores:** These are modest spaces scattered across a challenging landscape. These are the quick refuelling points where a vulture grabs just enough "energy" to stay in flight: a short rest, a thermal lift, a safe perch. They are not rich, but they are reliable. Examples of convenience stores in the world include forested patches in central Illinois, and parks and cemeteries in many large cities of eastern North America (e.g. Central Park, New York City; Mt. Auburn Cemetery, Boston, Massachusetts; Jackson Park, Chicago, Illinois).

• **The full service hotels:** These include the wetlands, grasslands, and productive valleys where birds may linger for days. Here they can glide effortlessly on rising thermals, find food, replenish their strength, and prepare for their next major crossing. These premium stopovers are the engines that power entire migration cycles. Examples in the world include the DeSoto National Forest and Pascagoula River bottomlands in Mississippi; Hiawatha National Forest, Michigan; and Great Smoky Mountains National Park and surrounding national forests in North Carolina.

Using telemetry data, fire escapes, convenience stores, and full service hotels can be identified across India and beyond. Once mapped, these landscapes become the foundation for more innovative and anticipatory conservation practices that help protect the full migration cycle.



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CENTRAL ASIAN FLYWAY

The Eurasian griffon's path falls within the Central Asian Flyway, a migration corridor that links India with about 30 countries across Central and West Asia, as well as southern Russia. It includes key range states such as Kazakhstan, Uzbekistan, Afghanistan and Pakistan, whose landscapes host the same bird species that winter in India.

The flyway's importance lies in this shared responsibility. Migratory birds rely on a continuous chain of wetlands, grasslands and safe stopover sites across borders and an environmental disturbance in any one of these countries can affect birds thousands of kilometres away. India's position at the southern end means that actions such as improving carcass management, reducing powerline risks and protecting feeding zones contribute directly to the stability of the wider population moving along this route.



© Captain S K Sharma

Linking movement to effective management and planning

Over the past few years, WWF-India has been collaborating with state forest departments to collect reliable data on the movement of India's threatened vultures. Since 2022, WWF-India has tagged seven individuals of four species: the red-headed vulture (*Sarcogyps calvus*), the white-rumped vulture (*Gyps bengalensis*), the Egyptian vulture (*Neophron percnopterus*), and the Eurasian griffon. They were tagged in Uttarakhand and Madhya Pradesh during the winter and early summer seasons, when vultures are easier to locate around feeding sites and roosts.

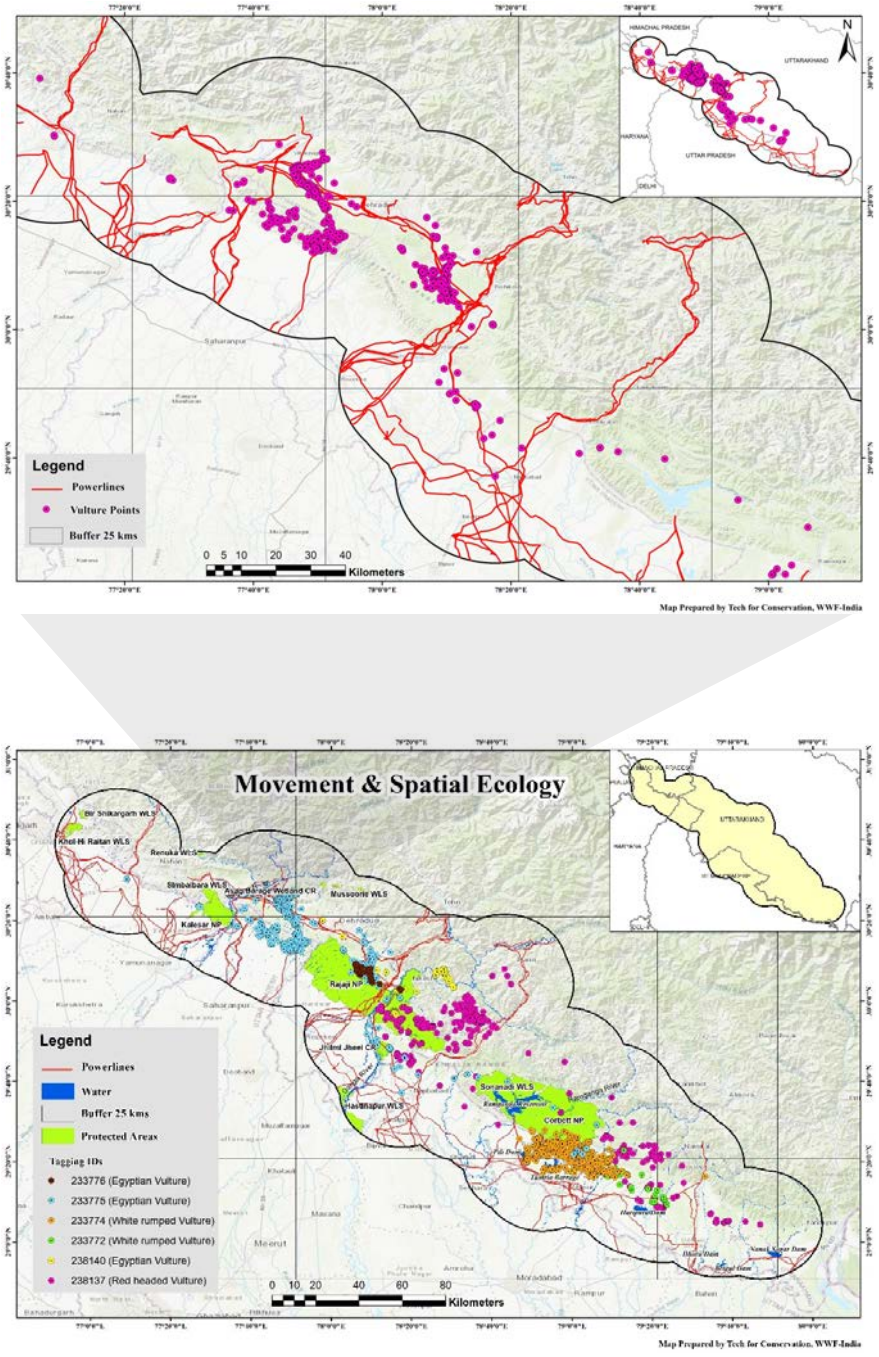
Just like the Eurasian griffon relied on fire escapes, convenience stores and full service hotels across Central Asia, the tagged vultures in Uttarakhand displayed the same ecological logic at a regional scale. Their GPS trails converged repeatedly at feeding pockets, riverside cliffs, carcass dumps, agricultural fringes, and forest–grassland mosaics, revealing the "stopover network" that sustains resident and migratory vulture populations in India and beyond.

As WWF-India analysed telemetry data from the tagged vultures in Uttarakhand, a pattern began to emerge. Several birds repeatedly slowed, circled, and descended near a particular stretch of Langha Road on the outskirts of Dehradun. The tags showed clusters of GPS points directly above a carcass dump near the Sitla tributary, indicating regular visits by vultures and large raptors to this site.

This recurring use flagged the area as a potential risk location, prompting a closer field inspection by the WWF-India team and the Uttarakhand Forest Department.

Ground checks confirmed what the movement data hinted. The carcass dump attracted birds almost daily, but a set of 33 kV powerlines ran directly above the feeding area. Over the years, this small stretch of Langha road was reported to have claimed more than 130 raptors, many electrocuted while landing, feeding, or navigating the waste laden site. Plastics and unmanaged dumping only intensified the danger, drawing birds into a hazardous mix of wires, meat waste and industrial debris.

To address this, WWF-India, in collaboration with the Uttarakhand Forest Department, facilitated the Uttarakhand Power Corporation Ltd. in insulating high risk lines in 2025. This 10 kilometre stretch of insulated power lines transformed a death trap for raptors into a safer zone, as initial observations indicate a significant decrease in mortality. However, long term change requires more effort and is dependent on municipalities and panchayats that must regulate carcass disposal, improve waste



Initial findings: Strong presence of Egyptian vulture in areas with powerlines



© Pushkar Suresh Nandanwar/WWF-India

management practices and integrate bird safe infrastructure into District Environment Management Plans. This intervention would not have been possible without the telemetry data that helped to map the risk to the raptors in this location.

Telemetry trails

Telemetry transforms the patterns from anecdotal observations to planning grade evidence. It helps identify high use clusters where feeding zones and roosting sites are most critical, how seasonal corridors cut across districts, and which human dominated areas carry hidden risks.

Therefore, telemetry becomes more than a scientific tool—it becomes the backbone of a Decision Support System (DSS). Such a DSS can integrate movement data, land use layers, powerline locations, waste disposal points, livestock patterns and habitat sensitivity into a single platform. For policymakers, this transforms the vulture's journey from a fascinating ecological insight into a planning instrument.

The long arc of the Eurasian Griffon's journey—from Madhya Pradesh to Kazakhstan and back to India—and the daily paths of the tagged vultures in Uttarakhand offer more than scientific curiosity. Together, they reveal patterns that quietly illuminate how landscapes, infrastructure and management intersect with the lives of wide ranging species.

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AFTER THE BOATS COME IN

Fish landings, underwater surveys and local knowledge are building a clearer picture of reef systems along India's central west coast

By Sumer Rao

It is 6:00 a.m. at Dandi Beach in Malvan, on the southern coast of Maharashtra. The sun lifts over the coconut trees, casting a pale light across water, the colour of beaten metal: flat and grey. Brahminy kites circle overhead, waiting for scraps of fish. On the sand, the morning's routine takes shape. Trucks rumble onto the beach and auctioneers gather in loose groups, pencils sharpened and notebooks at the ready. Fishers set out their catch in neat patches, using tarpaulin sheets, crates and makeshift tables to mark their space.

The fish landings here are busy and mixed. Trawlers, gillnetters and small artisanal boats all converge on this stretch of coast, producing a spread that reflects the range of gears in use. Here at Malvan, the usual species dominate the tables: tuna and predatory pelagics from long-liners working offshore; schooling species like mackerel (*Rastrelliger* spp.) and sardines (*Sardinella* spp.) from purse seines (large encircling nets) and silver pomfret (*Pampus argenteus*) caught using gillnets. Elasmobranchs, including milk sharks (*Rhizoprionodon acutus*) and spade nose sharks (*Scoliodon laticaudus*), lie in separate crates, routine landings from the region's multi-species trawl and gillnet fisheries.

Almost lost among the day's catch are the reef associated species of fish, the ones we have come to document.



On a strained wooden table lie six large groupers, a mix of orange-spotted (*Epinephelus coioides*) and Malabar groupers (*E. malabaricus*) with their characteristic black flecking. These individuals were fished only hours earlier from the submerged rocks known as Five Finger Reef, a little visited dive site off Malvan. Among the largest resident predators of the central west coast's reefs, they are slow growing, late maturing fish whose populations recover slowly when overharvested.

A five hour drive south into Karnataka and Murudeshwar tells a similar story, if not a more colourful one. Blue-ringed angelfish (*Pomacanthus annularis*), surgeonfish (*Acanthurus* spp.), snappers (*Lutjanus* spp.), blubberlips (*Plectorhinchus* spp.) and batfish (*Platax* spp.) regularly appear at the newly renovated fish market, a short walk from the temple. While they account for only a minor share of total landings, these species are key components of the reef communities just a little offshore, small in terms of catch but central, at least theoretically, to the functioning of the reef.

What these landings represent ecologically becomes clearer beneath the surface.



An orange-spotted grouper at the Dandi Beach landing site. These voracious predators show strong site fidelity and prefer rocky outcrops with plenty of ledges and crevices, traits that make them easy to target using hooks and lines.

A couple of kilometres offshore from Dandi Beach, the water turns murky green within five metres of the surface, dense with plankton and fine sediment. These reefs form a scattered chain along India's central west coast, from Malvan in Maharashtra to Grande Island in Goa and Netrani Island in Karnataka. The coral cover in this region is relatively low, dominated by species that compete for the limited hard substratum on which corals grow. There is also higher algal cover due to the higher nutrient load coming out of the coastal rivers. These corals also have more muted colours and the structure is largely flat. Yet these habitats support surprisingly intact fish communities, shaped by herbivores, cryptobenthic species (tiny bottom-dwelling fish that dart between rubble and crevices) and mid-level predators.

Herbivores handle much of the reef's daily maintenance. Parrotfish, rabbitfish and surgeonfish graze steadily across the substrate, cropping turf algae and preventing it from smothering the growth of these slow-growing corals. The blue-barred parrotfish (*Scarus ghobban*) is among the region's most effective grazers, though their activity is often difficult to observe on the nearshore reefs around Goa and Malvan, where visibility is limited. At Netrani Island, farther from the coast and with markedly clearer water, large schools move across the reef with near clockwork regularity, clearing space for coral colonies to grow and for larvae to settle. Rabbitfish, including the white-spotted spinefoot (*Siganus canaliculatus*), vermiculated spinefoot (*S. vermiculatus*) and the schooling Javan rabbitfish



A school of blue-barred parrotfish (Scarus ghobban) grazing across a shallow reef flat at Netrani Island, Karnataka.

(*S. javus*), contribute similarly, though at smaller scales. Surgeonfish add to this constant grazing pressure, forming an essential line of defence against algal dominance.

Predatory reef fish appear far more often than herbivores in fish landings, reflecting their larger size and higher market value. On the reef itself, fishers most often bring in snappers and groupers (*Epinephelus* spp.). Along the outer margins, queenfish (*Scomberoides* spp.), trevallies (*Caranx* spp.), barracudas (*Sphyraena* spp.), and cobias (*Rachycentron canadum*) are common. Though they occupy different parts of the habitat, each depends on productivity generated within and around the reef.

Groupers and snappers feed on reef fish and invertebrates, helping keep their numbers in check. When predator numbers fall, populations of mid-sized fish often increase, shifting pressure onto juveniles and other small-bodied species. Studies suggest these changes can alter reef community structure and reduce ecosystem resilience, potentially affecting recovery following disturbances such as prolonged temperature anomalies (Bellwood et al., 2004). While these ecological roles are increasingly well documented, efforts to measure their contribution to reef processes along the central west coast are still underway.

On most mornings during reef surveys, we descend along fixed transects, finning slowly just above the substratum while recording every fish that passes within view. Some species, like the square tail coral grouper (*Plectropomus areolatus*), materialise briefly out of the haze before disappearing again; others, like white cheek monocle breams (*Scolopsis vosmeri*) and red squirrelfish (*Sargocentron rubrum*), hold their ground just beyond reach; still others, like red-toothed triggerfish (*Odonus niger*), school overhead in the hundreds for the duration of the transect. Fish sizes are roughly estimated, along with underwater numbers, and compared across the various trophic groups, offering a sense of the biomass of different fish groups found in a reef system. Simultaneously, we document the reef's character, noting that shifts in substrate and coral composition often coincide with distinct fish communities. Over repeated surveys, these encounters accumulate into a record of who inhabits the reef, what roles they play, and how that composition may be shifting through time.

Yet quantifying these roles is another matter. Documenting rates of herbivory, for instance, requires patience. For minutes at a stretch, we hover, almost motionless, above the substratum, following a single grazing fish and tallying each bite. From these observations, we identify the reefs' most important grazers using a simple metric: bite rates per minute.



Rabbitfish, such as this Javan rabbitfish graze on turf algae and seaweeds, often moving in schools large enough to influence local algal cover. Their contribution to reef functioning along with that of other major herbivore groups is being examined along India's west coast.

A bluefin trevally (Caranx melampygus) circles the edge of the reef at Netrani Island. The species typically hunts by chasing down small fish, using short bursts of speed to catch them.

The landing sites offer a complementary view of the reef and the fishers knowledge sharpens this picture.

Seen on the sand, reef-associated fish can appear inconsequential, a few crates among hundreds. Yet landing sites offer a complementary view of the reef, revealing which species are being removed, in what numbers and sizes, and how these patterns shift across seasons and sub-habitats. Fisher's knowledge further sharpens this picture. Their observations, shaped by decades at sea, often extend far beyond the temporal limits of scientific monitoring, capturing changes in species' abundance, distribution, and size that would otherwise pass unrecorded.

Time underwater is always limited, even in well designed reef monitoring programmes.

Landings may point to patterns that surveys alone may miss, from the seasonal appearance of certain species to possible breeding periods and shifts in where fish are found. They can also bring to light fish that are seldom recorded by divers, including cryptic species and those that emerge mostly after dark.

Coastal reefs along India's central west coast function as multi use spaces with longstanding cultural and economic significance. For generations, these waters have supported fishing communities whose livelihoods remain closely tied to coastal productivity. Sustaining these systems requires understanding both their ecological condition and how people depend on them, particularly amid intensifying human use and a changing climate.

By late morning, Dandi Beach begins to empty. Auctions conclude, crates are loaded, and the catch disperses inland. Hours earlier, some of these fish moved across the reef—grazing, defending turf, hunting—their roles embedded within processes that escape notice. A little off shore, the reef carries on.

WWF-India is working to strengthen this understanding by documenting the reefs across these sites, from coral communities and associated fish assemblages, to patterns of use by different stakeholder groups. By building a robust socio-ecological baseline, the programme aims to support stakeholders in making informed decisions to safeguard these habitats.



All photos: © Sumer Rao/WWF-India

A scorpionfish (Scorpaenopsis sp.) from the offshore reefs of Malvan. These ambush predators rely on their incredible camouflage to capture unsuspecting prey moving close to the substratum.

A 'FRUIT FOREST' OF CHANGE

An innovative solution combines regenerative ecology and community-led conservation

By P Vamshi Krishna and Somreet Bhattacharya



Tucked away in the Warangal district of Telangana, against the rocky Eastern Ghats, lies Marrivanipalli, with its patchwork of forests and farmland spanning nearly 50 hectares. Here and in the neighbouring villages, farmers have been cultivating cotton, pulses, and maize crops. However, in recent years, a peculiar challenge had erupted, disturbing the harmony of the villages.

Drawn to the cotton bulbs during harvest season, troops of monkeys (rhesus macaques) began invading fields, causing widespread crop damage. Between 2014 and 2018, the problem worsened, forcing many farmers to switch from irrigated dry crops to paddy, which was a high water demanding crop and less profitable. This created a sense of acrimony among farmers and community members toward wildlife.

In 2024, WWF-India, in collaboration with Keshavpur Farmer Producer Company Limited (FPCL) and the Marrivanipalli Gram Panchayat, launched a bold and innovative solution: a "fruit tree forest". The idea was straightforward yet revolutionary—plant fruit bearing trees along the forest edge to attract the monkeys and keep them away from the fields. Over 10,000 fruit trees, including guava, custard apple, tamarind, and mango, were planted alongside an equivalent number of wild species across 25 hectares bordering the farmland.



The results were transformative—a forest reborn.

The newly planted “fruit tree forest” quickly began to thrive. Birds, small mammals and even carnivores, such as hyenas, returned to the area, attracted by the abundance of food and shelter. The forest became a flourishing habitat, restoring biodiversity and reducing human-wildlife conflict.

Ramakrishna, an environmentalist and member of the local governing body in nearby Sirisedu village, has seen the change first hand. Pointing to a group of red-naped ibis birds landing on nearby crop fields he said, “It’s truly heart warming to see nature returning and flourishing, bringing peace and pride to our villages”.

The impact was not just limited to wildlife. The forested buffer started stabilising water tables and revitalising nearby wetlands, supporting the region’s hydrological health. These wetlands feed into streams that eventually flow into the Godavari River.

The initiative also helped address another pressing issue: topsoil loss. The region’s red, sandy soil is highly susceptible to erosion, especially during the monsoon season. The plantation stabilised the hillock, preventing runoff and protecting the integrity of nearby fields. Farmers have reported improved crop yields, lower input costs, and greater resilience to climate variability.

Raji Reddy, who owns three acres of land near Erragattu hillock in Marrivani palem and has been cultivating it for over 20 years, recalls the toll of soil erosion on his fields. “Every rainy season, the topsoil from the hillock would wash down into my fields, causing heavy siltation. I had to spend INR 10,000 per acre to clear it. This increased my cost of cultivation and significantly reduced my income,” he explained.

Since the fruit forest was planted in 2022, Reddy has observed a notable improvement. “Soil erosion is now under control, and the problem of siltation has reduced significantly. My cost of cultivation has come down,” he says with satisfaction.

Enugu Amarendar Reddy, another farmer with two acres, shares a similar experience. “Between 2014 and 2018, the increasing attacks by monkeys on the cotton crops forced many of us to restrict our crop cultivation to paddy. Monkeys frequently damaged our fields, and cotton and maize became too risky to cultivate. The plantation initiative transformed the situation for us,” he says.





"With support from WWF-India, Keshavpur FPCL and the Gram Panchayat, we planted fruit trees across 25 hectares to create a 'fruit forest'. Since 2022, the number of monkey attacks has significantly decreased. Farmers in my area have resumed growing cotton and maize. The forest supplies monkeys with food and shelter and keeps them away from our fields, preventing crop damage and thus boosting our farm productivity," he adds.



Regenerative agriculture: A promising future

The success of Marrivanipalli's fruit forest has highlighted the broader potential of regenerative agriculture practices, which include sustainable land management and redesigning agroforestry models to more efficiently control soil erosion, rebuild soil organic carbon and ultimately protect wetland health. These agroforestry models follow a ridge-to-valley approach, with dense plantations established on hillocks and ridge areas.

Unlike traditional farming methods, which often deplete soil nutrients and rely heavily on chemical inputs, regenerative agriculture seeks to restore soil health, enhance biodiversity and ecosystem services. It is a flexible, place-specific approach that adapts to local environmental conditions and community needs.

As part of its regenerative agriculture principles, WWF-India had planted a fruit forest around Marrivanipalli and neighbouring villages as these interventions have the potential to reduce soil erosion by 46% through strategic plantations and agroforestry practices. The project is spread across Karimanagar and Peddapally districts of Telangana, under Godavari basin. Overall, this has also contributed to carbon



sequestration, amounting to 93,781 MT of CO_2 equivalent, achieved through 10,14,756 plantations with a 71% survival rate. Soil organic carbon in the project area has increased by 28%, rising from the baseline value of 0.32 within four years.

The plantations in Marrivanipalli have additionally supported the regeneration of natural vegetation across approximately 300 hectares of upland area, contributing to healthier local biodiversity. More than 53 avian species have been recorded in the region. This ecological improvement has also enhanced the pest predator balance, helping maintain pest populations below economic threshold levels.

Community-led conservation

One of the most notable aspects of the Marrivanipalli initiative is its community-led approach. The local Gram Panchayat has played a crucial role in mobilising resources, collaborating with WWF-India and ensuring the long term maintenance of the plantation. Local farmers, environmentalists and researchers have worked jointly to design and implement the project, integrating traditional knowledge with scientific expertise.

The success of this fruit forest has inspired neighbouring villages to adopt similar models. It has also generated interest among policymakers and agricultural experts seeking scalable, nature-based solutions to mitigate human-wildlife conflict and land degradation.

A model for the future

As climate change worsens and biodiversity declines accelerate, Marrivanipalli's story offers a hopeful model. It demonstrates how regenerative agriculture, combined with ecological restoration and community participation, can address complex issues—from crop damage and soil erosion to water shortages.

The 'fruit forest' may have begun as a clever way to shield cotton fields, but it has evolved into something much greater—a symbol of resilience, innovation and harmony between humans and nature.



All photos: © Somreet Bhattacharya/WWF-India

HOPE IN HIDING

Fishing cat of Mukundra Hills

By Dr Kamlesh K Maurya, Akshay Jain & Dr Debashish Panda

The Mukundra Hills Tiger Reserve (MHTR) in Rajasthan has offered a reason to celebrate. A camera trap installed by WWF-India to monitor co-predators, prey and their habitat in the Borabans range of the Reserve in 2020 captured an image of the elusive fishing cat (*Prionailurus viverrinus*)—a species rarely observed in this part of India. The identification was confirmed by its distinctive features: shoulder stripes, elongated black spots running in parallel lines along the back and a short, muscular tail marked with incomplete black rings.



© Rajasthan Forest Department/WWF-India

The Mukundra Hills Tiger Reserve, characterised by rugged terrain, undulating hills and steep slopes, also features a mosaic of dense forests, open grasslands and vegetation dominated by dhok (*Anogeissus pendula*), salai (*Boswellia serrata*), khair (*Acacia catechu*) and palash (*Butea monosperma*). It supports a rich diversity of fauna, including tigers, leopards, sloth bears and the Indian grey wolf, as well as herbivores such as chital, sambar, nilgai and wild boars. Rivers such as the Chambal, Kalisindh, Amjhar, Brahmni and Ahu sustain the region's biodiversity[1].

WWF-India conducted a camera trapping exercise in and around MHTR between February and June 2020, as part of its annual tiger monitoring programme, deploying 178 pairs of camera traps across a 2 sq km grid based on indicators of predator activity. Camera trap locations were selected based on signs such as scats, scrapes, scent markings, claw marks and pugmarks that indicate the presence of predators.

The footage from the camera traps was further analysed using an artificial intelligence based species identification system developed by WWF-India, which matches the features of a known species to the camera data. The findings revealed the presence of a fishing cat, which is not typically found in this area. The photo of the fishing cat was captured in the camera trap at 7:43 a.m. on 17 February 2020 in



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the Borabans range of MHTR[1]. To verify the system's findings, the data was further reviewed and confirmed by species experts. Although no fresh evidence of the cat was recovered recently, teams from WWF-India now plan to use the same system to scan footage from camera trap devices installed in other parts of the landscape to establish the presence of this elusive felid.

As of 2025, the image represents the first ever photographic evidence of the fishing cat in MHTR, a welcome addition to the mammalian fauna of the Reserve and the semi arid landscape.

The fishing cat's presence was captured in a mixed vegetation zone, approximately seven kilometres from the Chambal River. The sighting of a fishing cat in semi arid Rajasthan is encouraging and considered "significant" as it is a notable extension of its known range—a surprising distance for a species typically associated with water.

According to a study[2], fragmented fishing cat populations in India exhibit lower genetic diversity compared to closely related species. However, if individuals are traversing long distances through varied habitats, this could enhance gene flow and improve population resilience. The presence of seasonal streams, wetlands and the Chambal riverine ecosystem within MHTR may offer suitable microhabitats for the species.

In addition to the first photographic evidence, another sighting of the fishing cat was reported from the Ramgarh Vishdhari Tiger Reserve in September 2025. Previously, fishing cats were also sighted in Bharatpur and Ranthambhore Tiger Reserves in 2012-13, indicating the species' presence in these landscapes[4].

The discovery underscores the importance of targeted field surveys in underexplored landscapes, particularly in light of the rapid pace of land use changes and the degradation of freshwater habitats. The finding is crucial as it indicates the extension of the known western limit of the fishing cat's range but also raises important questions about its adaptability to semi-arid landscapes, offering new hope and direction for its conservation.

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ROOTS OF RENEWAL

A community-led startup is healing forests and rebuilding trust in the Sathyamangalam Tiger Reserve

By Steffan RJA Ajay

In the shadow of the Western Ghats, where the forests of Tamil Nadu stretch into the Eastern Ghats via the Great Moyar Corridor, a quiet transformation is underway. Once known for a troubled past of poaching and wildlife smuggling, the Sathyamangalam Tiger Reserve is now emerging as a beacon of inclusive conservation—led not by outsiders but by the very communities that call these forests home.

At the heart of this transformation is the Talavady Adhivasigal Munnetra Sangham (TAMS), a community based organisation that advocates integrating traditional practices into conservation efforts, redefining what it means to conserve, restore and thrive.

The forest that fought back

The forests of Sathyamangalam are vast and diverse, encompassing tropical dry thorn, deciduous, semi-evergreen and riparian ecosystems. They are also deeply human landscapes, with over 150 villages woven into the reserve's core and buffer zones. Four major local community groups call this area their home. For decades, these communities lived under suspicion, their lives shaped by the legacy of the infamous forest brigand Veerappan and the heavy handed search operations that followed.

In 2016, WWF-India organised a visit for TAMS members to Vazhachal forests in Kerala to understand how the Community





Forest Resources Rights (CFR) and Community Rights (CR) are implemented under the Forest Rights Act 2006 by tribal communities. The communities protect the forest and sustain their livelihoods by practising mutually beneficial conservation practices, such as sustainable harvesting of non-timber forest products (NTFP), river health assessments and biodiversity monitoring. Inspired by this model, the team at TAMS saw a new path forward for communities in Sathyamangalam. In 2024, TAMS, with the support of WWF-India, enabled 10 gram sabhas to receive their Community Rights (CR) under the Forest Rights Act 2006 from the Government of Tamil Nadu. This CR title has enabled communities to access forests for their livelihoods.

Turning a weed into wealth

The breakthrough came in the form of an unlikely threat to the forest: *Lantana camara*, an invasive weed unpalatable to most herbivores. The shrub had overrun vast stretches of forest, suppressing the native biodiversity. This, in turn, escalated human-wildlife conflict as wildlife strayed into human dominated areas, driven by habitat degradation. But where others saw a problem, TAMS saw potential.

In 2024, TAMS Tribal Green Fuels Pvt Ltd—a startup launched its operations—removed lantana from the forest, converted it into eco-friendly briquettes and sold them as an alternative energy source for industries. In just over a year, TAMS had sold 550 tonnes of lantana briquettes, provided livelihoods for 420 families and cleared lantana from 70 hectares of forest area within the core of Sathyamangalam Tiger Reserve.

This wasn't just a business—it was a movement. Backed by an innovative equity based funding model from Startup Tamil Nadu and with technical support from WWF-India, TAMS had become a symbol of what community-led entrepreneurship can achieve when rooted in ecological wisdom and community ownership.

A hallmark of this model is its emphasis on leadership, particularly that of women from the community. TAMS now has three women directors on its seven-member board and 11 women hold shares in the company out of its 30 shareholders. In fact, women leaders from the community have taken charge as theme based coordinators for activities, including lantana removal and the restoration of lantana infested forest areas using local species.





A model for the nation

Today, TAMS is exploring new ventures, such as biochar, cellulose and eco-leather made from invasive plant species—each grounded in the same principles of sustainability, equity and community leadership. The model they've built in Sathyamangalam is more than a local success story. TAMS has now designed restoration plans for lantana-free sites, combining indigenous knowledge with scientific expertise and begun the restoration process.

It's a blueprint for how conservation can be inclusive, development can be regenerative and trust—once broken—can be rebuilt. In a forest once marked by fear and exclusion, a new story is being written: one of renewal, perseverance, resilience and rootedness. At its heart are the people who never stopped believing the forest could be theirs again.



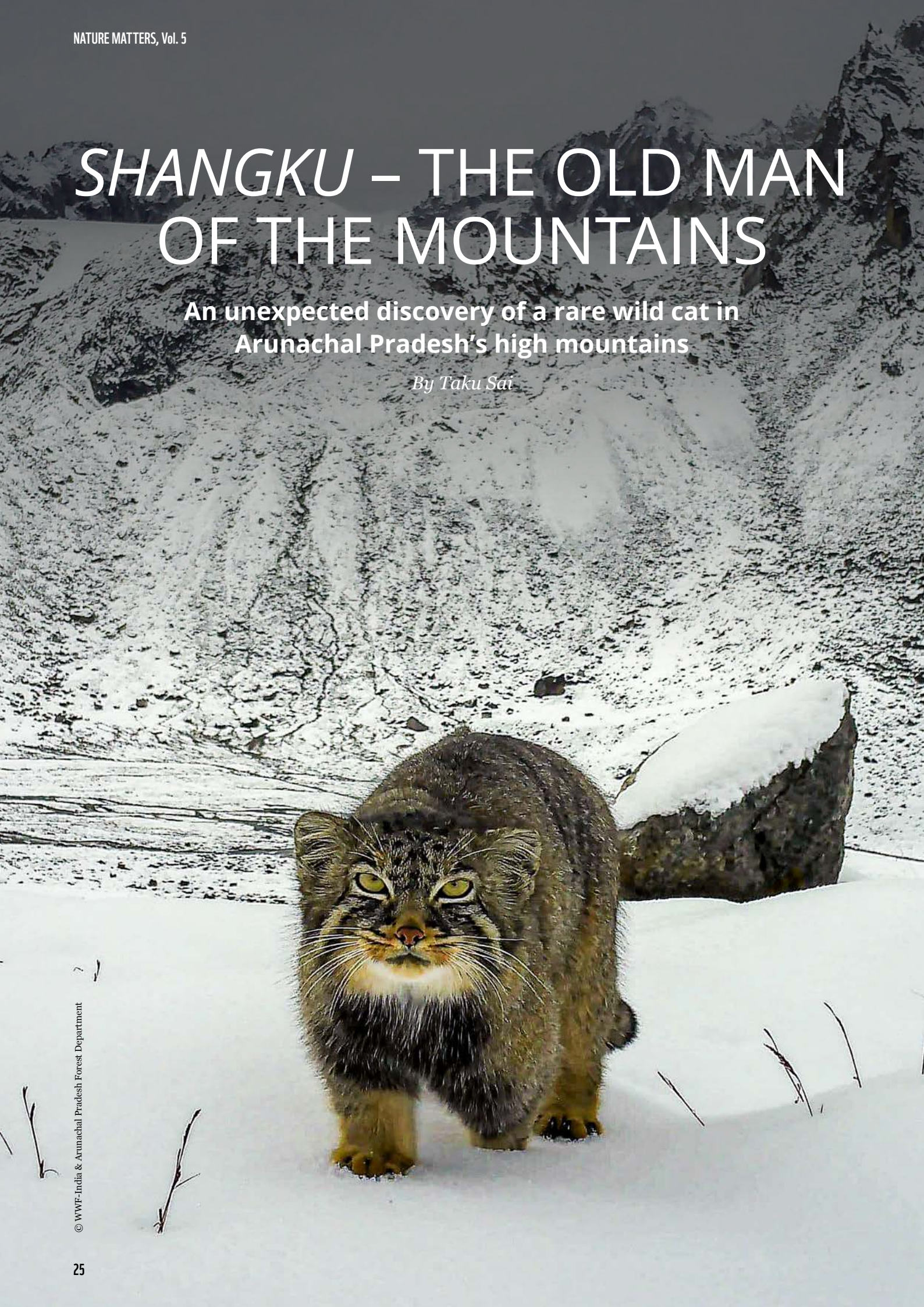
All photos: © Steffan RJA Ajay/WWF-India



SHANGKU – THE OLD MAN OF THE MOUNTAINS

An unexpected discovery of a rare wild cat in Arunachal Pradesh's high mountains

By Taku Sai



© WWF-India & Arunachal Pradesh Forest Department



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The animal with the face of an old man has always intrigued the Brokpa herders as they take their yaks to graze in the rangelands around Tawang, Arunachal Pradesh. Most of them have seen it appear from behind rocks in the grasslands, but they have never considered it a threat. They call it the *Shangku*.

When I first heard their accounts, a few of the traits they described reminded me of species I was familiar with, though none fully aligned with what the herders insisted they had seen. Still, I grew increasingly curious about what the *Shangku* might be. The presence of such an elusive cat had never crossed my mind until recently, when a camera trap installed by WWF-India to monitor snow leopards captured a photo of a small wild cat. With its silvery fur and grey eyes, it appeared to have approached the camera—perhaps to inspect the unfamiliar device.

The journey in the high Himalayas

In 2024, WWF-India conducted a snow leopard monitoring survey with guidance from local communities and support from the Forest Department, Government of Arunachal Pradesh, under the project Reviving Trans-Himalayan Rangelands—*A Community-led Vision for People and Nature*. The project is funded by the UK Government through the Darwin Initiative. It aims to combat the degradation of fragile, high altitude alpine rangelands and its impacts on biodiversity and pastoralist livelihoods by developing a community-led vision and a co-management model in the Indian



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Trans-Himalayas. Essentially, it seeks to recognise the Changpa and Brokpa herder communities as stewards of these rangelands, benefiting both people and nature.

As part of this effort, I began examining human-wildlife interactions in the landscape—specifically how the Brokpas perceive and relate to wildlife—while also preparing for surveys to assess the population of snow leopards and their prey species. Driven by curiosity, I set out to meet the community, build trust, and begin my first surveys. As I listened to their stories about daily life and encounters with wildlife, I was already thinking ahead. These conversations would help us plan the upcoming camera trapping exercise for snow leopards.

The Brokpas and the old man

During 2023 and 2024, I visited villages of the Brokpa herders—people who live among yaks and dzo-dzomo (a hybrid of yak and domestic cow) in the expansive, rolling meadows of Arunachal Pradesh's high altitudes. Their world is far removed from the bustle of urban life. The air is thin and pure, and the silence is broken only by the wind and the sound of yak bells.

During one such survey, some herders shared stories of a strange animal they frequently encountered, which they described as having an "old man's face,"



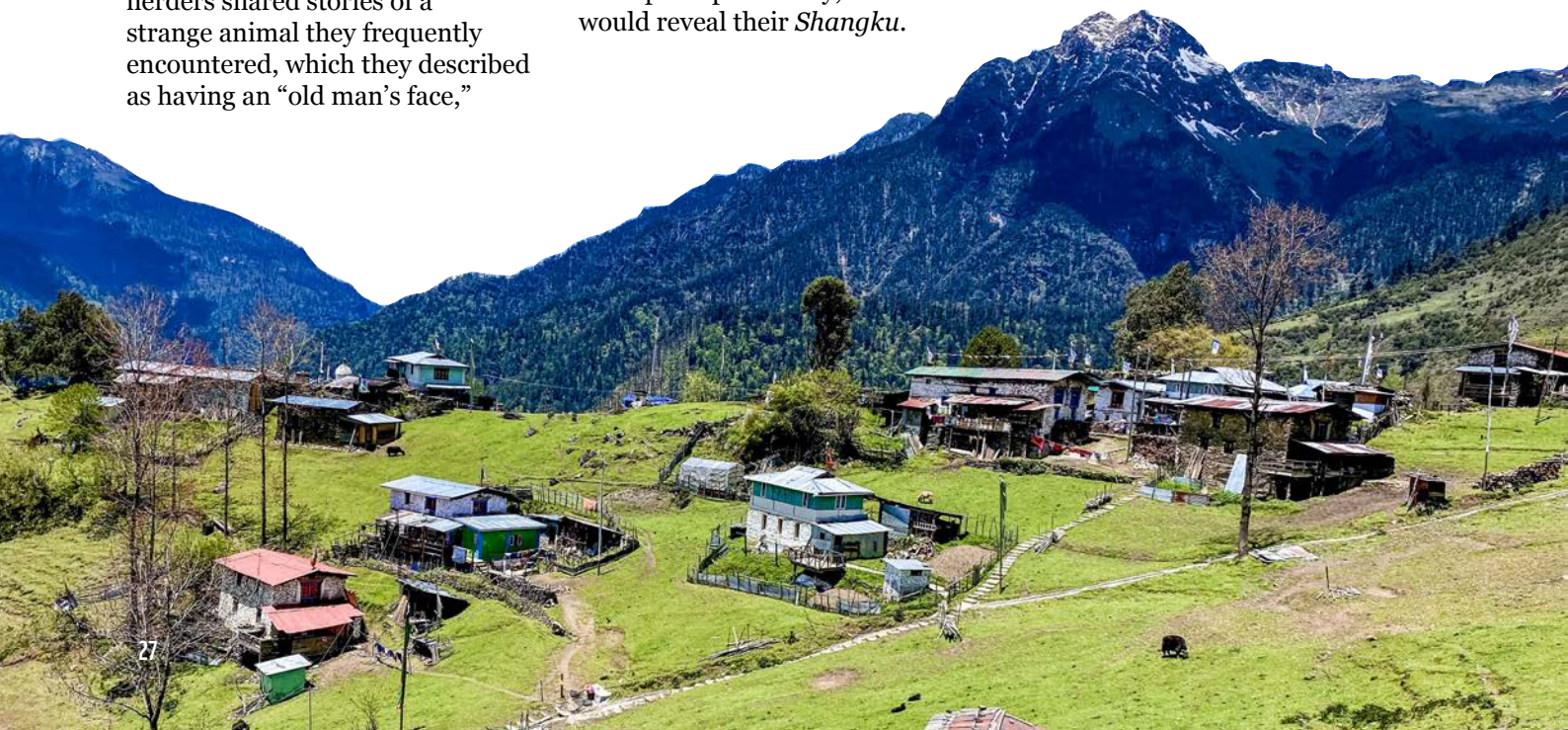
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with thick grey fur, seen on the high pastures. They would say, "We see an animal that looks like *ayi* (grandmother) or *meme* (grandfather), but it does not harm our cattle, so we are not bothered by its presence," all the while imitating its face and tracing long whiskers with their hands.
At first, I tried to match their descriptions with species I knew. Could it be a Himalayan wolf? Or perhaps a Tibetan sand fox? Both share some of the features they described. Although neither has been reported from this landscape, I wondered—could this be a discovery? Yet every time I showed them photographs, the herders shook their heads and firmly denied it. Their certainty stayed with me, and I made a mental note: perhaps one day, a camera would reveal their *Shangku*.

The long wait

Months later, we deployed 136 camera traps across more than 2,000 square kilometres of high altitude grasslands, between 4,000 and 5,500 metres above sea level, in the West Kameng and Tawang districts. The survey was intended to monitor snow leopards, but I could not stop thinking about the stories I had heard. As the cameras sat silently through snow and wind—perched along ridgelines, near yak pastures, and across the vast rangelands—my curiosity about the *Shangku* only deepened and I hoped it would reveal itself.

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A surprise from the mountains

The answer came months later. After retrieving the cameras, our field assistant, Pemba Romo, called me one evening. “Do snow leopard cubs have rosettes?” he asked, wanting to be sure before drawing any conclusions. When he shared the photograph, I was awestruck. This was no snow leopard cub. Staring back at me was a stocky animal with a face resembling that of an old man. I gasped aloud, scarcely believing what I was seeing—a Pallas’s cat, photographed for the first time in Arunachal Pradesh.

For a moment, I could hardly process what was on the screen. A rush of excitement washed over me. Almost instinctively, I called my supervisor, Dr Rishi Kumar Sharma, to share what felt like a remarkable discovery. As I described the image, it finally clicked: this was the very animal the herders had spoken about during my surveys. Their “Old Man of the Mountains” had, at last, revealed itself.

More than a photograph

This single image, captured at nearly 5,000 metres above sea level, marked the first photographic record of the Pallas’s cat in Arunachal Pradesh. It underscored a simple yet profound truth: people who live close to the land often know its secrets long before science documents them. The survey also revealed another remarkable aspect of Arunachal’s alpine ecosystem. We recorded snow leopards, clouded leopards, marbled cats, leopard cats, and even common leopards—six wild cat species above 4,200 metres. The coexistence of cats ranging from the tiny leopard cat to apex predators like the snow leopard in such a harsh, high elevation landscape speaks to the extraordinary richness of the Eastern Himalayas biodiversity hotspot.



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What lies ahead

Much remains unknown about this shy mountain cat. How many live here? What prey sustains them in this landscape? How do they survive alongside larger predators like snow leopards? These questions will guide our next steps. For now, however, the image of that silver-grey cat serves as a reminder: the high Himalayas still harbour mysteries and when science listens closely in the silence of the mountains, old stories sometimes come alive.

DRIVING A SUSTAINABLE FUTURE FOR INDIA'S STEEL INDUSTRY

By Vishal Dev and Mansi Chauhan

Steel is deeply embedded in our daily lives. It forms the backbone of our homes and offices and the public infrastructure we rely on—right down to countless appliances and household essentials we use every day. Yet, despite being all around us, steel's environmental cost remains largely out of sight. Unlike traffic emissions or plastic waste, the pollution from steel production is rarely visible to the people who benefit from it. This hidden footprint has kept steel production out of everyday climate conversations, even though it is among the most carbon-intensive industries, accounting for nearly 12% of India's total CO_2 emissions.

Climate impact

The invisibility of the steel industry's environmental impact often masks a crucial reality: *India's steel sector is considered "hard-to-abate" because it is structurally dependent on coal.* Coal is used not only as a fuel to reach temperatures above 1500°C to melt iron ore, but also as a chemical reductant essential for converting iron ore into steel in blast furnaces and basic oxygen furnaces (BF-BOFs). Due to decades of investment in this coal reliant BF-BOF infrastructure, the transition is complex and capital intensive. The climate impact, however, is undeniable.



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India's growth trajectory further amplifies this challenge. The country's per capita steel consumption is 97.7 kilograms[1], about one-third of the global average, suggesting significant potential for future expansion. As India's economy grows, the steel demand is forecasted to nearly triple by 2050. Under the National Steel Policy (2017), India aims to reach 300 million tonnes of crude steel capacity by 2030, with most of this capacity still expected to come from coal based production routes (BF-BOF). If this expansion follows traditional methods, emissions from the steel sector could increase approximately 2.5 times by 2030[2], exerting substantial pressure on national and global climate targets.

These emissions are more than just climate statistics; they pose immediate threats to ecosystems and biodiversity. The carbon released during steel production contributes to global warming, leading to increased heatwaves, disrupted rainfall patterns and altered habitats that countless species rely on to survive. India's dependence on coal based steelmaking exacerbates these effects by contributing to air pollution and environmental damage associated with coal extraction. These interconnected pressures make it crucial to decarbonise the steel sector, allowing India to pursue industrial growth without harming the environment and remain aligned with the global effort to limit warming to 1.5°C.

According to the Ministry of Steel, the steel industry has an average emission intensity of 2.54 tonnes of CO_2 per tonne of crude steel (tCO_2/tcs) , nearly double the European benchmark.

Transitioning to Green Steel

Transitioning to green steel production is essential to align India with long term decarbonisation strategies. Green steel is steel produced with clean energy rather than coal. This can be achieved through pathways such as the use of Green hydrogen–based Direct Reduced Iron (DRI) in electric arc furnaces (EAFs), integrating renewable energy instead of a coal based grid supply, increasing scrap steel use and promoting recycling and circularity. The combination of these technologies nearly eliminates emissions, bringing them close to zero. The closer emissions get to zero, the greener the steel becomes.

India Green Steel Coalition (IGSC)

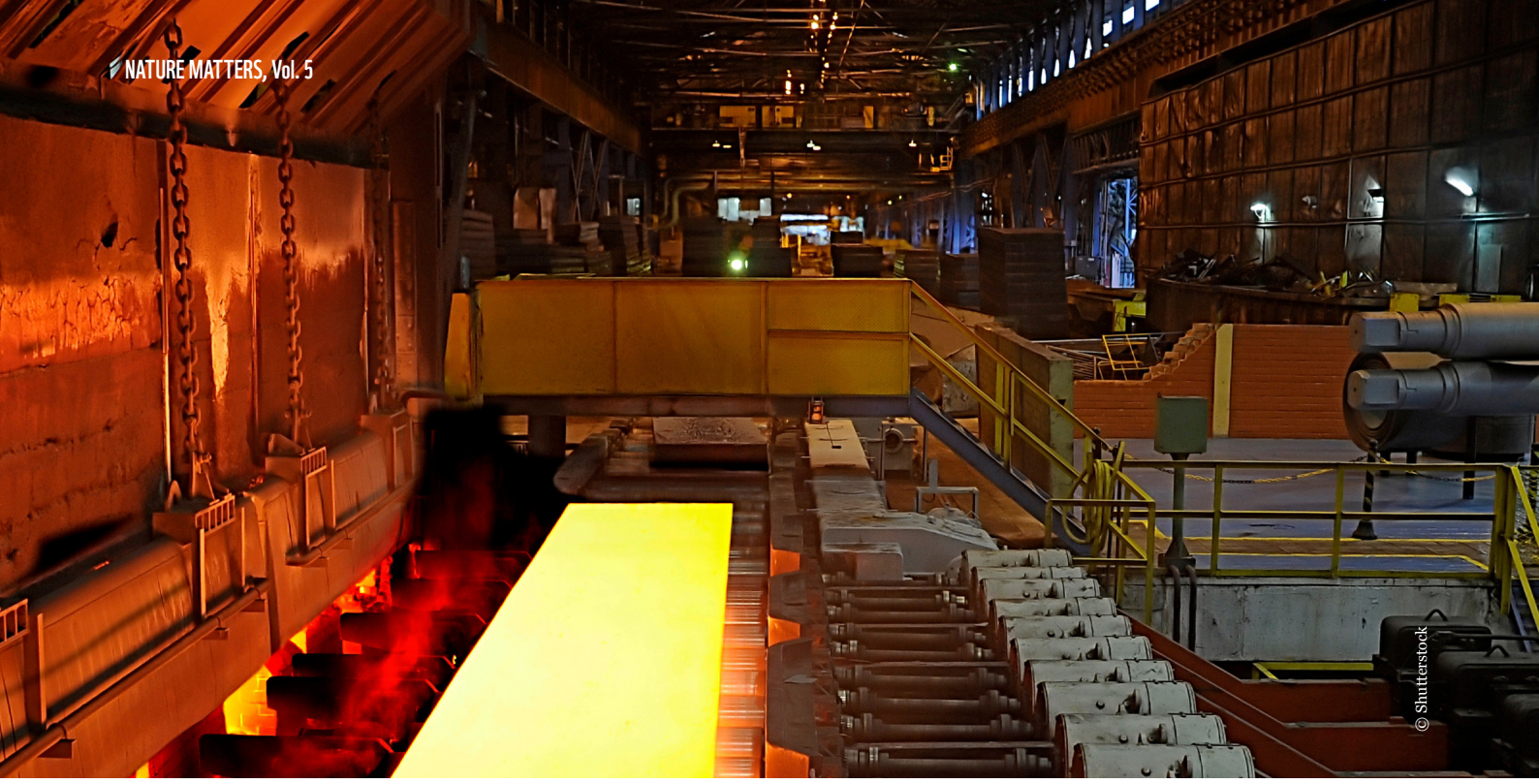
WWF-India began a deep engagement with the steel sector and together with the Confederation of Indian Industry (CII), launched the India Green Steel Coalition (IGSC) in September 2024. The Coalition represents over 70% of India's steel industry and has a clear goal:



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[1]*Ministry of Steel, Government of India. (2024) Greening the steel sector in India: Roadmap and action plan. Neha Verma, Deepak Yadav, Karthik Shetty, Rudhi Pradhan, Karan Kothadiya, Rishabh Patidar, Hemant Mallya, Sobhanbabu PRK, Dr. N K Ram, Souvik Bhattacharjya, Manish Kumar Shrivastava, Arupendra Nath Mullick, Mayank Aggarwal, Mandavi Singh (Authors).*

[2]*Global Energy Monitor's database of Global Steel Plant Tracker*



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to reduce the emissions intensity of India's steel production by 30% compared to 2023 levels by 2030. It aims to discourage new investments in traditional blast furnace technology after 2030. Its purpose is to ensure that India's industrial growth continues—but on a cleaner, more sustainable path.

IGSC adheres to the internationally recognised benchmark that green steel should emit less than 0.5 tco_2/tcs, in line with definitions set by the International Energy Agency (IEA) and ResponsibleSteel. IGSC is working throughout the entire ecosystem. The Coalition promotes thought leadership through white papers, offering data backed guidance for the industry and policymakers. Through its Renewable Energy Action Group and Scrap & Circularity Action Group, IGSC supports the development of renewable powered steel clusters and the utilisation of high quality scrap, enabling affordable decarbonisation pathways for both primary and secondary producers. Additionally, the Policy Action Group focuses on shaping regulatory and procurement reforms to help green steel scale more rapidly. Capacity building initiatives ensure that smaller producers and regional stakeholders are not left behind in this transition.

According to IGSC's assessment, the economic case for green steel is strengthening rapidly. Today, producing green steel, especially through green hydrogen–DRI routes, carries a "green premium," often amounting to about 3-5%[3] extra cost for the final product. For example, a INR 10 lakh car made with green steel may cost around INR 30,000 more, a relatively small increase for steel with near zero carbon emissions. However, this premium is temporary. As renewable power scales up and technologies improve, costs are expected to decrease significantly, with the premium falling to negligible levels (less than 1%) by 2030. When that occurs, green steel will no longer be expensive—it will be competitive.

However, technology and cost parity alone will not drive transformation. The true catalyst will be demand. If buyers, ranging from automobile companies to



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[3]*IGSC. (2025, July 28). Unlocking green steel demand in India. India Green Steel Coalition. https://www.indiagreensteelcoalition.org/reports-articles/unlocking-green-steel-demand-in-india/*

construction developers and infrastructure investors, start choosing low emission steel, the market will shift more quickly. Every conscious procurement decision, whether made by government entities or individual consumers, sends a strong signal that speeds up investment in clean steelmaking. With robust policy support, India's demand for green steel is expected to reach 179 million tonnes by 2050, unlocking a significant low-carbon market.

Highlighting Green Steel at #COP30 in Belém, Brazil

WWF-India highlighted India's pivotal role in driving global demand for green steel during the 2025 United Nations Climate Change Conference. Over the past decade, COP has evolved into a crucial platform where governments, businesses and civil society jointly shape the global climate agenda. The private sector has become central to this shift by driving innovation, investing in clean technologies and embedding sustainability into long term strategy. In this context, WWF-India's session



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on *Catalysing Global Demand for Green Steel* at COP30 in Belém, Brazil aimed to strengthen collective understanding and build global alignment on one of the most emissions-intensive industries. Speaking at the Finland Pavilion, WWF-India outlined how early private-sector commitments to green steel consumption, along with strong policy signals, can shape the global transition to low-emission steel. As the world's second largest steel producer, India's early market commitments and procurement choices will influence investment, technology adoption and long term decarbonisation pathways worldwide. Insights from the India Green Steel Coalition (IGSC) were shared at the session, which also highlighted that harmonised definitions, transparent certification systems and supportive fiscal tools are essential to making green steel viable, competitive and accessible.

Conclusion

Green steel is not a new concept; it will gradually become mainstream. Its development could mirror the rise of renewables and electric vehicles, once viewed as costly and niche but now central to global decarbonisation and, in many cases, the most cost effective options. As the world raises expectations for low carbon supply chains and investors increasingly factor emissions into decision making, India has a strategic opportunity to accelerate its transition to low impact steel production. The steel we produce today will shape future infrastructure, industries, and societies. Green steel can form the backbone of a sustainable global economy. India has both the opportunity and the responsibility to shape that future, demonstrating that growth and environmental care can coexist in harmony with the planet.



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IN FOCUS

RESTORING THE ARKAVATHY

Reviving wetlands, rebuilding resilience

By Amit Dubey, Shashikala Iyer and Abhishek Sah

The Arkavathy River originates in the Nandi Hills of Karnataka and flows southward through Bengaluru before joining the Kaveri River. Historically, it served as the lifeline of Bengaluru rural district, sustaining a dense network of lakes that met the city's freshwater needs and supported agriculture, livelihoods and biodiversity in peri urban and rural areas. Over time, rapid urban growth and changing land and water use patterns have placed immense pressure on this river basin. Wetlands are losing hydrological connectivity and water holding capacity leading to reduced freshwater flows into the Arkavathy River. As wetlands play a crucial role in groundwater recharge, flood regulation, biodiversity conservation and community well being, their decline has triggered cascading impacts across the river system, eroding the ecological services they once provided.

Steps towards recovery

In 2014, WWF-India, with support from HSBC's *Aadhrabhoomi* – Wetlands for Life programme, began working with the Government of Karnataka on a multi-stakeholder, science based pilot to restore the health of two wetlands: Kokkarebellur Community Reserve in Mandya district and Kunigal Doddakere in Tumkur district. The efforts focused on restoring lake health by removing excess silt and invasive plants, and improving water inlets and outlets. Awareness programmes and community engagement were central to the effort, helping local communities understand the importance of wetlands and water conservation.

At Kokkarebellur Community Reserve, the work also included upgrading the nature





interpretation centre to support conservation education. At Kunigal Doddakere, additional efforts focused on planting native trees in the catchment, training farmers from 10 nearby villages in sustainable agriculture and millet cultivation, and forming local lake protection groups or *Kere Sanrakshana Samitis* to support long term stewardship. The pilots built a strong foundation for future restoration actions across wetlands.

Between 2016 and 2019, with support from Nokia, the restoration efforts expanded to Bashettihalli Wetland in the Bengaluru rural district. From 2021 onwards, wetland restoration efforts were anchored by the Climate Solutions Partnership, supported by HSBC and extended to various urban and peri-urban wetlands in Karnataka.

As the programme evolved, WWF-India adopted a basin scale approach—restoring individual wetlands while keeping the health of the entire Arkavathy river system in focus. In total, 49 wetlands, 41 within the Arkavathy River Basin and eight within the city of Bengaluru, were selected for health assessment and intervention. Scientific assessments to monitor the wetland health formed the backbone of this initiative and included hydrogeological studies to assess groundwater availability, biodiversity surveys, and drone based mapping to understand wetland condition, catchments, and connectivity. Wetland health scorecards—aligned with national protocols developed by the Ministry of Environment, Forest and Climate Change (MoEF&CC)—were used to assess and monitor wetlands across the basin systematically. Based on these assessments, six highly degraded but high potential wetlands were shortlisted for intensive restoration.

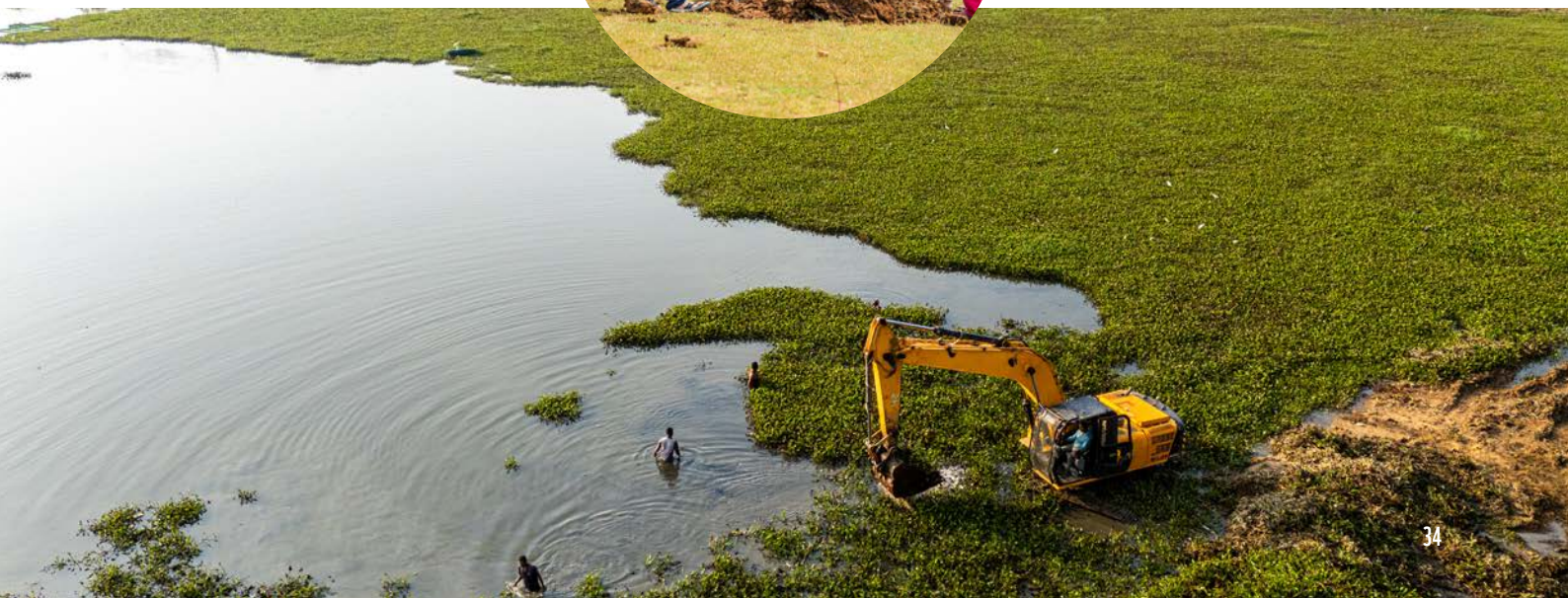
Wetland restoration

Across sites, restoration efforts have combined Nature-based Solutions, scientific inputs, and strong community participation to improve wetland health. Activities have included desilting, removal of invasive aquatic plants, restoring natural water inlets, outlets and drainage channels, and improving water quality through in-situ measures such as floating plant islands using Typha (commonly known as cattail) to absorb excess nutrients like nitrates and phosphates from sewage and other waste, along with solar powered floating fountains to improve aeration.





Alongside on-site restoration, the work extended to catchment management, conservation education and the formation of community groups to steward wetlands, with the overall aim of restoring hydrological connectivity, strengthening ecological functions and improving water flows within the Arkavathy river system.





A people's movement

Community stewardship has been central to the initiative. Over a thousand Wetland Mitras—or friends of wetlands—from diverse backgrounds have emerged as local custodians, supporting activities such as wetland monitoring, clean up drives, awareness campaigns and reporting emerging threats.

Over the years, the initiative has reached nearly 50,000 people, including local farmers and fishing communities, students in cities, towns, and villages, civil society organisations and scientific institutions. Active participation by Resident Welfare Associations, self help groups, schools, panchayats and municipal bodies has strengthened shared ownership and responsibility for wetland protection. The programme has also strengthened coordination among State departments and local governance institutions, creating a more enabling environment for long term wetland management.





Powered by partnerships

Wetland restoration efforts have been rooted in close collaboration with key government institutions, whose stewardship has been central to this journey. These include the Karnataka Forest Department, Minor Irrigation Department, District Administration of Bengaluru Rural, Bruhat Bengaluru Mahanagara Palike (BBMP), City Municipal Council, Doddaballapura, Taluk Panchayat, Doddaballapura and multiple Town and Gram Panchayats. Community based institutions such as the Bashettihalli Kere Samrakshana Samiti, Konaghatta Temple and Lake Committee, Community Reserve Committee and Fishery Cooperative Societies have played a key role, along with lake focused trusts including the Yelahanka Puttenahalli Lake and Bird Conservation Trust and the Madiwala Lake Tank Foundation.

Technical and scientific support has been provided by the Indian Institute of Science (IISc) Bangalore, Geovale Services, The Energy and Resources Institute (TERI), INRM Consultants, Tamil Nadu Agricultural University, Bombay Natural History Society (BNHS), Indian Veterinary Research Institute (IVRI), Bangalore and the Department of Animal Health and Veterinary Biologicals,

Coorg, with coordination from the government departments including forest department, district administration and Groundwater Directorate.

Early impacts

Several wetlands have shown clear signs of recovery, with improved wetland health scores recorded at Bashettihalli, Nagarakere, Hesarghatta, Shivpura, Sarakki Kere, Kodhalli Kere and Puttenahalli lakes. Enhanced biodiversity has been observed at Bashettihalli, Nagarakere, Hesarghatta, Madiwala Lake and Puttenahalli, with Nagarakere showing particularly strong





recovery due to improved water quality. Bashettihalli Lake has also recorded a gradual rise in groundwater levels, indicating improved recharge and water availability. Overall, close to 80,000 people living near these wetlands have directly benefited from improved water security because of borewell recharge, cleaner water, mitra trainings and improved ecological conditions.

A blueprint for wetland management

The restoration efforts in the Arkavathy River Basin and the related positive impacts on wetland health demonstrate a scalable, replicable model rooted in robust science, Nature-based Solutions, multi-stakeholder partnerships and community participation. By recognising wetlands as vital natural assets and empowering communities as long term custodians, the initiative aligns closely with national priorities and emerging frameworks for climate-resilient development.





All photos: © WWF-India

WILD CRY

HUNTER ON THE TRAIL

An extraordinary wildlife sniffer dog from Kawal Tiger Reserve

By Manasvi Gusain

In Telangana's Kawal Tiger Reserve, one wildlife crime fighter reports for duty without a uniform, badge, or weapon—and still delivers results. Guided by razor sharp instincts, unwavering focus, and an exceptional nose, Hunter, a one-year-old wildlife sniffer dog, is on the frontlines of the fight against forest crime.

Hunter completed an intensive seven month training programme in August 2025 at the the Basic Training Centre of the Indo-Tibetan Border Police Force, Panchkula (Haryana), under WWF-India's Wildlife Sniffer Dog Training Programme. Trained alongside his handlers, L Anil Kumar and R Parmeshwara, Hunter learned to operate as part of a seamless team—reading subtle cues, building deep trust, and preparing for the unpredictable challenges of real-world field operations.





Initially trained to detect wildlife products such as bones and skins of tigers and leopards, elephant tusks, bear bile, deer antlers and plant products like red sanders and caterpillar fungus, Hunter quickly adapted to the ground realities of Kawal Tiger Reserve after deployment. Hunter soon became a crucial asset in tracking smugglers, detecting illegal felling and curbing the trade that endangers the Reserve's biodiversity.

Hunter wasted no time proving his mettle. In his very first week in the field, forest officials investigating a suspected teak smuggling case recovered a discarded shirt—one of the few clues left behind. Given the scent, Hunter immediately picked up the trail, following it all the way to a village. A few decisive barks outside a house pointed officers to the suspect. Hunter had cracked his first case within days of deployment.



In October 2025, another teak smuggling incident brought Hunter back into action. This time, a towel left at the crime scene proved to be the key. Hunter tracked the scent for nearly four kilometres, leading officers straight to the suspect's residence. The recovery of teakwood from the house confirmed the crime and resulted in an arrest.

Around the same period, footprints discovered at a separate crime scene presented yet another test. Once again, Hunter followed the scent trail unerringly to the suspect's home.

The pattern continued into November. When teak trees were illegally felled in a forest area, Hunter was called in yet again. Using a handkerchief recovered from the site, he tracked the scent for nearly four kilometres, stopping outside a house in a village. Teakwood recovered from the premises sealed the case.

On 18 November, Hunter tackled a different kind of crime—a poaching case involving a spotted deer (cheetal). Tracking the scent for nearly three kilometres, he led officials to the suspects house, where roasted deer meat was recovered.

Just days later, on 26 November, Hunter assisted in another teak smuggling case in the Jagtial Division. With no leads available, the division sought assistance from Kawal Tiger Reserve. Given the scent from a cap found at the site, Hunter walked directly to the house of the suspect two kilometres away.

Since his deployment, Hunter has played a key role in solving numerous wildlife crime cases in and around Kawal Tiger Reserve, including seven cases of illegal teak smuggling and five wildlife poaching cases involving spotted deer, sambar deer, wild boar, and a leopard.

Hunter's story is not just about one remarkable dog; it highlights the growing importance of wildlife sniffer dog in safeguarding forests and wildlife. By providing precise scent based leads, sniffer dogs enable forest departments to respond more quickly and strengthen investigations.

In landscapes where silence and distance often favour offenders, dogs like Hunter are tipping the balance—one trail at a time.



ABOUT WWF-INDIA'S WILDLIFE SNIFFER DOG TRAINING PROGRAMME

WWF-India launched a pioneering wildlife sniffer dog training programme with support from TRAFFIC in 2008. Two wildlife sniffer dog squads were trained in the first batch at the Basic Training Centre of the Indo-Tibetan Border Police Force, Panchkula (Haryana). Since then, 120 wildlife sniffer dog squads have been trained under the programme, assisting Forest Departments and the Railway Protection Force across 22 states and union territories in their efforts to combat wildlife crime and protect endangered species. Each dog squad consists of a highly trained dog and two handlers, teams that form the sniffing backbone of India's frontline defences against wildlife trafficking. These dogs act as force multipliers, especially in remote landscapes where evidence is scarce, and offenders often believe they can disappear without a trace. To know more about the programme, please visit https://www.wwfindia.org/about_wwf/super_sniffers/

All photos: © Telangana Forest Department & WWF-India

INTERVIEW

BRIDGING PEOPLE AND FOREST

Somreet Bhattacharya in conversation with a *Bagh Mitra* – strengthening human-wildlife coexistence in and around Katerniaghat

The Terai forest, lying in the foothills of the Himalayas, is one of India's most biodiverse regions. Yet it shares its edges with densely populated villages, where the boundaries between human and wildlife habitats often blur. As people's livelihoods expand, so does the likelihood of conflict with wildlife.

In 2019, WWF-India in partnership with the Uttar Pradesh Forest Department, launched the *Bagh Mitras* ("friends of the tiger") programme to address this challenge. Local volunteers are trained to work with the forest department—to track straying wild animals, report sightings, assist in rescues and manage crowds to prevent dangerous encounters. They also help families claim compensation for livestock or crop losses caused by wildlife. Over time, the programme has grown into a community-led conservation movement, with over 200 *Bagh Mitras* active in villages around the Pilibhit and Dudhwa Tiger Reserves in Uttar Pradesh.

Among them is Manju Devi, one of the few women in the role, based at Katerniaghat on the fringes of the Terai along the Indo–Nepal border. She leads a small group of men and women, guiding them in assisting the forest department in promoting coexistence between people and wildlife. In her work, she is helping her community navigate the delicate balance of living alongside the forest—and the tigers within it. She speaks with Somreet Bhattacharya from WWF-India.



What inspired you to become a Bagh Mitra?

During my childhood, it was fairly common for tigers to enter our paddy fields and during the harvest season, we would form groups to keep watch. I received no formal education while growing up because my father was poor, but I was always taught to coexist with the wildlife around us.

My husband also worked in the paddy fields for many years, and I was constantly worried about his safety, especially since he sometimes went alone to till land close to the forest. Hog deer and wild boars often entered the fields and tigers followed. Many times, a tiger would even give birth in the fields,

unable to distinguish between grasslands inside the forest and ripened crops.

Conflict arose when people tending the fields suddenly came face to face with tigers, leopards, elephants, or even wild boars, leading to negative outcomes.

I could not accept this conflict—seeing both people and wildlife suffer—and it motivated me to join the *Bagh Mitra* programme two years ago. During the training, I learned measures and precautions that can help farmers, including my husband, coexist with wildlife. I knew I had made the right choice.



"Many times, a tiger would even give birth in the fields, unable to distinguish between the grasslands inside the forest and ripened crops."

Describe your role as a Bagh Mitra?

As a *Bagh Mitra*, my role is to create awareness within my community about coexistence with wildlife. This work is not limited to reaching people who go to the fields along the forest fringes—it is an inclusive effort. I work closely with women and children to help them understand wildlife and the reasons behind the conflict, and the precautions needed to stay safe. Local schools and *mahila samitis* have also become effective centres for carrying out these sensitisation activities.

Many times, tigers, leopards, and even jackals attack cattle or poultry when animals are grazing or left unattended near forest areas. Many families depend on their livestock for milk or eggs, so the loss of even a single goat or cow can significantly affect a household. Therefore, alongside creating awareness, we also support community members in availing compensation through government mechanisms for livestock losses or crop damage caused by wildlife. We have been trained to fill out the required forms and to support community members through the entire process of seeking compensation claims. Timely interventions like these help reduce tension and prevent negative impacts on wildlife.

"As a Bagh Mitra, my role is to create awareness within my community about coexistence with wildlife."

How challenging was it for you to volunteer as a Bagh Mitra, convince your family, and then inspire other women to join?

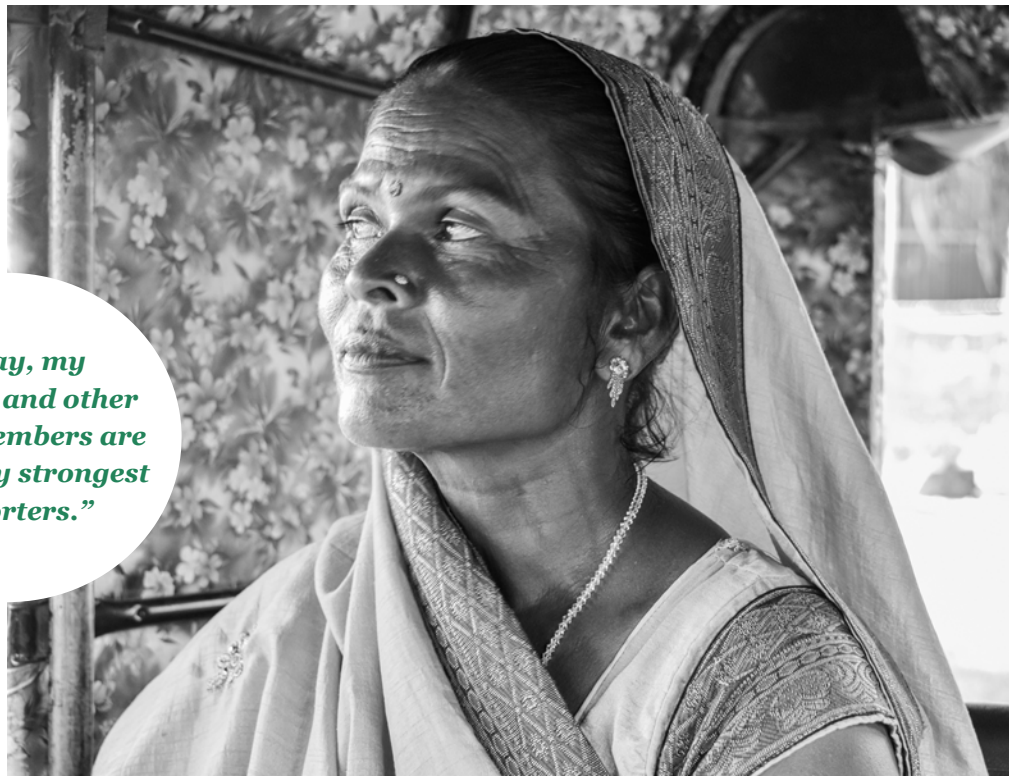
We come from a conservative community, as do most villages in this region. When I first volunteered as a *Bagh Mitra*, my husband and other family members were apprehensive.

They had observed the work of other *Bagh Mitras* and understood that the role could require stepping out late at night if a wild animal entered the village, or if crowds gathered at a sighting. Until forest officials arrive to safely relocate the animal, such situations can be risky and it becomes our responsibility to ensure that people maintain a safe distance.

Over time, these concerns began to ease as my family saw that my work also involved raising awareness in schools and engaging with other women in the community. Today, my husband and other family members are among my strongest supporters. He now accompanies her to meetings and community awareness programmes, often dropping her off on his motorbike.



What are the most common situations involving carnivores like tigers and leopards?



Most often, when a tiger or leopard kills domestic cattle grazing in nearby fields—or even a pet dog—there is deep resentment among local families who have suffered the loss. Many people form strong emotional bonds with their domesticated animals and such incidents often provoke anger. In the past, this has sometimes led to attempts to poison the carnivore. Over time, we have built trust and rapport with community members. We work together to ensure that people stay away from conflict sites and that cattle do not stray into forests or areas frequently used by tigers and leopards. In the case of elephants, we also advise communities not to store food in places accessible to them. Such small but practical measures can significantly reduce the potential for conflict.

"Today, my husband and other family members are among my strongest supporters."

How do you respond when a tiger enters a village or farmland?

We have a WhatsApp group where other *Bagh Mitras* and community members share sightings and locations. As soon as we receive an alert, we act immediately, informing people to stay away from the area until the animal is safely secured. We convene emergency meetings with women and children to ensure they remain indoors, and we also coordinate with local schools so that extra precautions are taken during lunch breaks and after school hours. Keeping people informed is key to reducing direct interactions with wildlife.

"By working together, we were able to manage the situation and prevent any mishap."

What has been your most memorable experience since becoming a Bagh Mitra?

Recently, a tiger entered our fields and the crowd that gathered grew increasingly agitated as the animal could not be found. It was the harvest season, the crops were ripe, and there were serious concerns about safety—especially for children, who often play in the fields. While the forest department was making efforts to track the tiger, some villagers, driven by anxiety, went into the fields to search for it themselves, which was extremely dangerous.

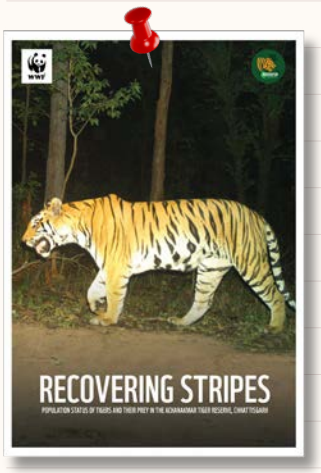
However, we were able to convince the women to keep the children away and the men were persuaded to stay clear of the area where the tiger had been sighted. Eventually, the animal returned to the forest on its own. By working together, we were able to manage the situation and prevent any mishap.

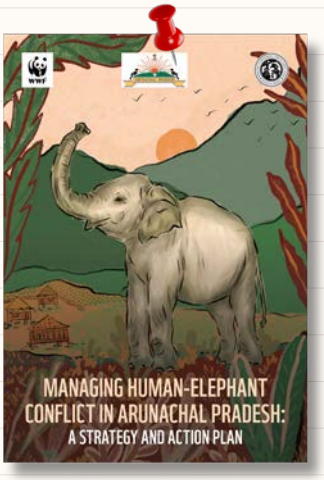
All photos: © Somreet Bhattacharya/WWF-India

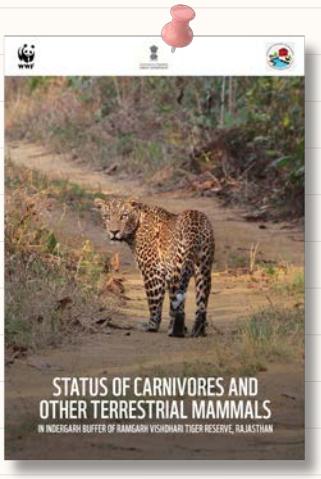


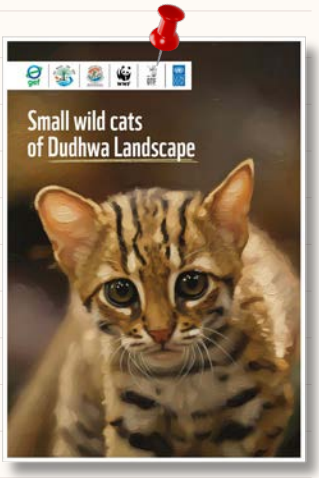


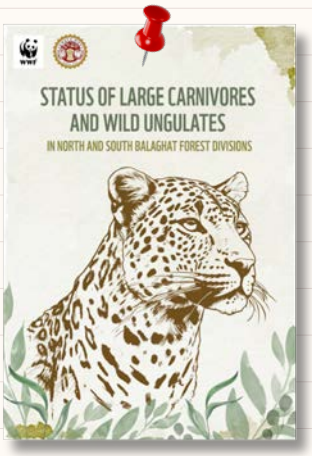
PUBLICATIONS



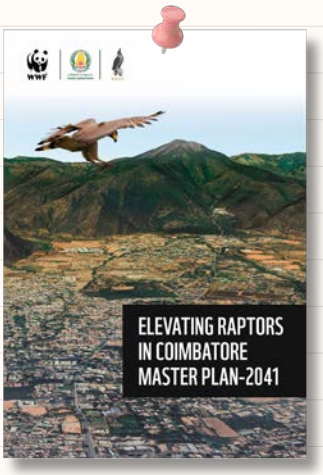


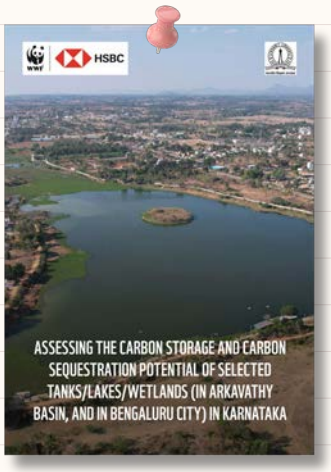




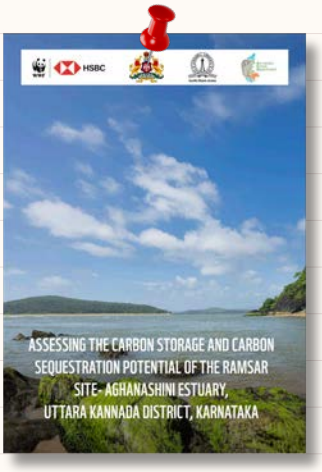


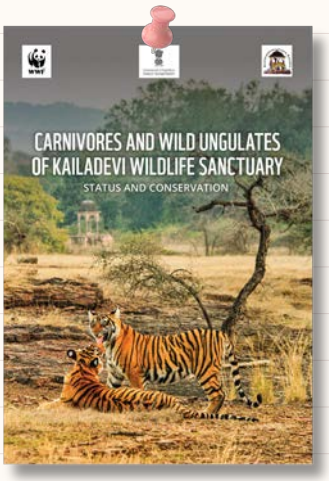


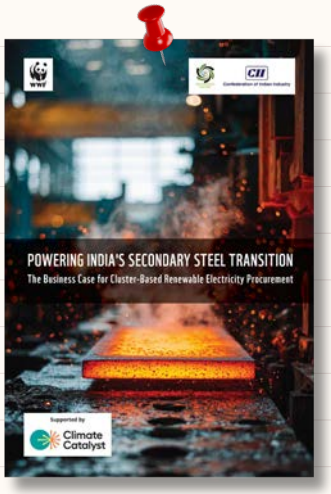


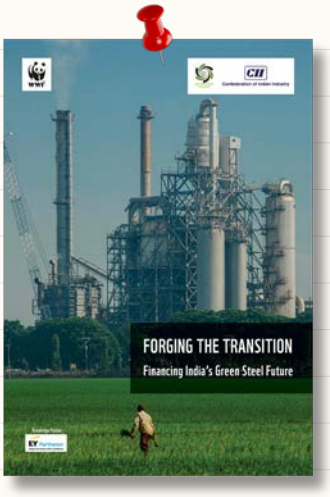




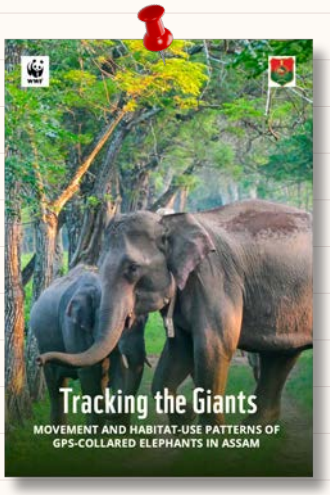


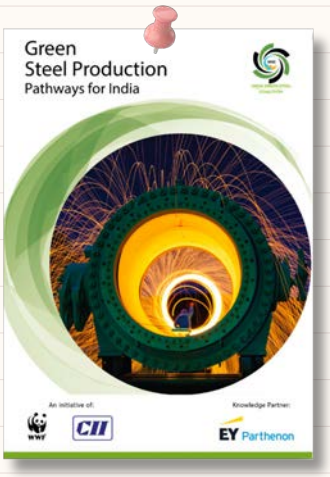

CARNIVORES AND WILD UNGULATES
OF KAILADEVI WILDLIFE SANCTUARY
STATUS AND CONSERVATION

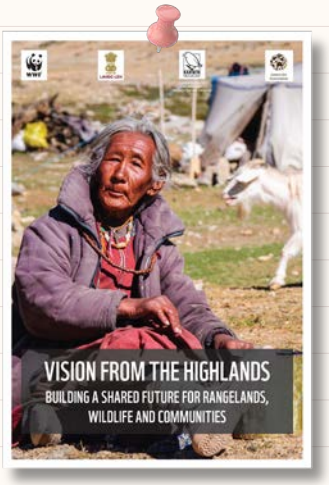

POWERING INDIA'S SECONDARY STEEL TRANSITION
The Business Case for Cluster-Based Renewable Electricity Procurement
Climate Catalyst

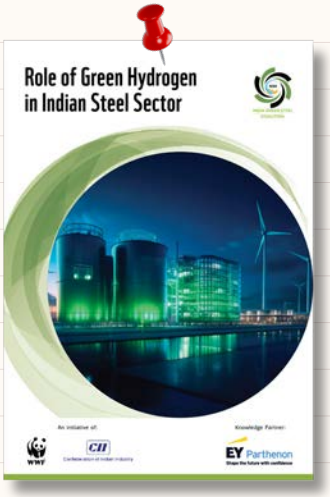

FORGING THE TRANSITION
Financing India's Green Steel Future

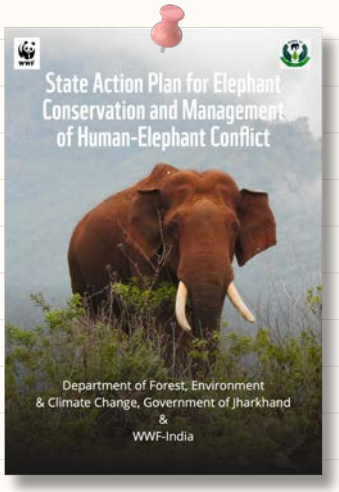

CLOSING THE LOOP
SCRAP MARKETS TO POWER
INDIA'S GREEN STEEL TRANSITION


Tracking the Giants
MOVEMENT AND HABITAT-USE PATTERNS OF
GPS-COLLARED ELEPHANTS IN ASSAM


Green
Steel Production
Pathways for India
EY Parthenon


VISION FROM THE HIGHLANDS
BUILDING A SHARED FUTURE FOR RANGELANDS,
WILDLIFE AND COMMUNITIES


Role of Green Hydrogen
in Indian Steel Sector
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State Action Plan for Elephant
Conservation and Management
of Human-Elephant Conflict
Department of Forest, Environment
& Climate Change, Government of Jharkhand
&
WWF-India


HSBC
RAMSAR SITES OF KARNATAKA


HSBC
KEY WETLANDS FROM BENGALURU URBAN
AND RURAL DISTRICTS, KARNATAKA




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