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Sanctuary Asia

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THE FALSE ASHOKA COMPLACENCY
(AND OTHER STORIES)

Restoration projects in India.

CAN REWILDING SAVE THE PARIS AGREEMENT?

The potential to address climate change in a global context.

REWILDING THE PLANET

Turning theory into practice... the human face of rewilding.

Photo Credit: Dr. Anish Andheria

FOREVER STRIPES

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

The wildlife conservation movement needs the support of us all. For more information on how you can help, or to pledge your support for those who work round-the-clock to protect our wildlife, write to Dr. Anish Andheria (President, Wildlife Conservation Trust) at anish@wctindia.org or visit www.wildlifeconservationtrust.org

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DSP
MUTUAL FUND

Pranav has been creating, curating and editing content for over 25 years. He was the founding editor of M, *a premium lifestyle magazine. Since 2010, he has told stories about wildlife, wild spaces and unsung heroes on the frontlines of conservation.*

Geographer and environmental educator based in Colombo, Ian has been exploring Sri Lanka's diverse natural and human landscapes for decades. The degree that humans interact and impact these landscapes has been a recurring theme in his documentation and studies.

Growing up in Arunachal Pradesh, Neyi built a close relationship with the forest from an early age. As the Coordinator of Sanctuary's Mud on Boots Project, she visited Vishal Ahuja in Chamba Valley, where she witnessed his dedication towards rewilding.

A wildlife biologist and nature writer, Bhavya is interested in conservation, environmental policy and carnivore ecology. She is an Assistant Editor at Sanctuary Asia *and a member of RewildEd, which works to bridge the gap between people and nature through education.*

Issued in the interest of wildlife

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Sanctuary Asia October 2023

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On the cover

Manas National Park is a time machine, each visit transports you to a time before *Homo sapiens* appeared. The cover image, looking like a scene from winter utopia, was actually taken in peak summer. The photographer followed this rhino for weeks until he found it at this spot, which for him encapsulated Manas. The greater one-horned rhinoceros *Rhinoceros unicornis* and its home was once almost wiped out from Manas. Project Tiger's mandate was to rewild with next to no human interference and the late Sanjoy Deb Roy, helped bring the forest back to life through rewilding. Manas represents hope for our troubled planet. This issue of *Sanctuary Asia* brings together rewilding stories from across the globe, ranging from Chile to Australia, and from Nagaland to Kerala.

Photographer: Soumabrata Moulick
Manas National Park

24 Cover Story

The False Ashoka Complacency (And Other Stories) There's a deluge of mindless tree-planting raging through India. But ecological restoration of different biomes offers comprehensive, nature-based solutions to restore the subcontinent's biodiversity and stabilise the Earth's climate. **Pranav Capila** spotlights rewilding and restoration projects in India that go beyond mere trees, to restore damaged land to their original status in a geography ranging from Haryana to Kerala, and Gujarat to Nagaland.

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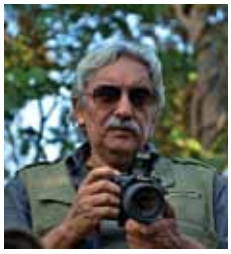
SUBHASH NAIR/SANCTUARY PHOTOLIBRARY



Bittu Sahgal,
Editor, Sanctuary Asia

The Elephant in the Room

That gleaming white incisor you see on this page used to be a life saver for elephants. But in recent centuries, it has turned into a death sentence for the much-loved, much-worshiped pachyderm. Mercifully, a crackdown on poaching gangs in India has ivory poachers in temporary retreat, but hold the elephantine celebrations. India has found new ways of triggering elephant deaths that threaten to dwarf the impact of even the most prolific poachers.

One such is graphically depicted by those red, unpalatable blooms you see next to the elephant combing its once-rich forest home in Kabini, Karnataka for familiar foods. Toxic to humans and most animals including elephants, this South American import was introduced by the British as an ornamental plant in the 1800s. In the decades that followed, ill-informed land use policies by colonisers promoted over-grazing by cattle, monoculture plantations, and, post-Independence, the unfettered use of fossil fuels and industrial scale deforestation that led to soil death and climate-triggered, forest fires helped *Lantana camara* to run amok. The plant now dominates many of India's poorly-funded wildlife sanctuaries and parks.

And that's not the end of it.

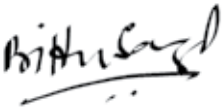
Along with the sun-tolerant *Lantana camara*, India has been invaded by water hyacinth *Eichhornia crassipes*, mesquite *Prosopis juliflora* (*gando bawal* or the mad tree in Kutchh), and parthenium *Parthenium hysterophorus*, a flowering aster gifted to India by the USA under its PL 480 programme. These, and a host of others, threaten to dominate something like 60 per cent of India's wildernesses. And for these invaders, India's unfortunate planet mismanagement has been a boon. Like Trojan Horses, alien plant species are edging out native vegetation, depriving wild animals including mammals, avians, fish, frogs, insects and even the soil microflora and fauna with which they co-evolved.

The writing is on the wall for India and all other nations... nature is asking us to kneel before it in worship. If we don't, it will force us to kneel in subjugation.

This issue of *Sanctuary Asia* spotlights solutions to our climate crises, through the rewilding and the resurrection of carbon-sequestering natural forests, grasslands, wetlands, coasts, and corals. Yet the elders continue to overwrite Earth's permanent survival infrastructures with short-lived economic infrastructures – dams, mines, highways, townships and commercial monocultures. The young know that the biosphere operates through homeostasis, and is self-repairing. What they cannot fathom is why their elders are behaving so irrationally.

India's *Rig Veda* spoke of our dependence on nature a millennia ago.
Never has *Homo sapiens* so desperately needed to unite in defence of our biosphere. Between *Sanctuary's* covers, a host of solutions have been offered to tackle our self-inflicted climate woes, prime among them being the imperative of restoring natural ecosystems and the biodiversity from whence we and the elephant in the room sprang.

Why are we waiting?



Bittu Sahgal
Editor, Sanctuary Asia

WORLD SCAN

JUST NINE SPECIES CAN HELP ACHIEVE OUR 1.5°C GOAL

While technology is being explored to capture carbon dioxide from the atmosphere, research has found that nine species, or groups of species, could extract 500 billion metric tonnes of carbon dioxide from the atmosphere by the year 2100. This would help achieve the goal of the Paris Agreement by halting temperature rise to less than 1.5°C. These nine species are grey wolves, wildebeest, American bison, musk oxen, African forest elephants, sea otters, whales, sharks, and other fish. Protecting species and allowing them to perform their ecological roles in the ecosystem, is vital to any realistic climate change solutions. For instance, when the wildebeest population was restored in the Serengeti by way of disease management, there was a dramatic drop in wildfires, which helped the ecosystem to function as an effective carbon sink once again. The lead author of the report, Prof. Oswald Schmitz, (see page 36) famously said, "Fortunately, we have the technology to scrub CO_2 from the atmosphere. It's called nature."

GLOBAL FUND TO SUPPORT BIODIVERSITY CONSERVATION

In a bid to achieve global biodiversity goals sooner, 185 countries came together to launch the Global Biodiversity Framework Fund (GBFF). The money is intended to help nations conserve ecosystems and wild species, which are increasingly threatened by human activities, and extreme weather events including wildfires, floods and droughts. The GBFF was ratified at a Global Environmental Facility (GEF) assembly. The private sector, governments and philanthropic organisations have promised to contribute to the GBFF, to enable protection, restoration and sustainable access to natural resources. Canada and the United Kingdom have committed $146.8 million and $12.58 million to the fund respectively. The fund will be operational with an initial kitty of $200 million (a pittance compared to the amounts being earned by those profiting from carbon-intensive 'development'). Many countries require these funds to be able to meet biodiversity goals set in the Global Biodiversity Framework. At least 36 per cent of the fund will be used to support 'most vulnerable people, small island developing states, and least developed countries', and 20 per cent is earmarked to support Indigenous and local action.

PUBLIC DOMAIN/CHARLES J. SHARP

Protecting species such as the musk oxen and allowing them to perform their ecological roles in the ecosystem, is vital to any realistic climate change solutions.

WHEN DID ANIMALS FIRST APPEAR ON EARTH?

The first evidence of animals on Earth exists in fossils that go back about 574 million years, to the Cambrian period. The fossils show a sudden 'explosion' of life on Earth, which belies theories of gradual evolution of species. Scientists, including Charles Darwin, have however suggested that animals evolved much earlier than the Cambrian period, but were unable to explain the missing fossil evidence. The 'molecular clock', which is based on genetic mutation rates, places animal evolution at 800 million years, during the early part of the Neoproterozoic era. A team of researchers led by Dr. Ross Anderson from the University of Oxford's Department of Earth Sciences strived to understand if the gap in this estimate and the fossil record could be attributed to the lack of preservation of animals that were too fragile or soft and lacked mineral-based shells or skeletons. On analysing the rocks, the researchers found that while most did not have the compositions necessary for preservation, three deposits in Canada, Siberia and Norway did have the conditions favourable for their preservation but still did not have any fossil records. This is the "first evidence for absence" and suggests that animals may not have evolved in the Neoproterozoic era. The scientists now plan to search and analyse even younger Neoproterozoic deposits to confirm the exact age of rocks in which fossil animal records are absent to take us one step closer to knowing exactly when animals evolved on the planet!

- ICELAND LIFTS BAN ON COMMERCIAL WHALING AFTER TWO MONTHS: Government commits to more monitoring; a restored whale population of four to five million could help sequester over 1.5 billion metric tons of CO_2 annually.
- INDONESIA, MALAYSIA BEGIN TALKS WITH THE EU OVER PALM OIL IMPORT RULES: The EU Deforestation-Free Regulation prohibits imports of commodities sourced by clearing forests; the palm oil giants say the rules are discriminatory towards small farmers!
- INVASIVE SPECIES CAUSE £391 BILLION ANNUAL GLOBAL LOSSES, FINDS UN AGENCY: The IPBES report says humans have introduced 3,500 dangerous alien species in different biomes, which are harmful to native species.
- UNESCO WORLD HERITAGE SITES HOME TO A FIFTH OF KNOWN LIFE ON EARTH: The IUCN and UNESCO analysis found that two-thirds of all mammals and nearly three-quarters of all recorded bird species live on one per cent of the planet.

INDIA SCAN

NORTHEAST A HOTSPOT FOR ILLEGAL TRADE IN SMALL CAT PARTS

With authorities cracking down on the illegal trade in tiger, leopard and snow leopard parts, poachers have found new targets – small cats. Smaller felids such as clouded leopards, leopard cats, golden cats and marbled cats have become increasingly popular game for poachers seeking 'quick money' owing to the rising demand for their parts – pelts, skulls, teeth, claws and bones – in Myanmar, India, China, Malaysia and Thailand. Mizoram, in India, particularly the Champhai district, has emerged as a centre for illegal wildlife trade. This is likely because of its proximity to the porous border with Myanmar, where much of the demand for wild animals and their parts comes from, and less patrolling on account of the dense jungles here. Poverty and corruption drive participation in this illegal trade. However, local efforts to raise awareness against hunting small cats is very gradually resulting in fewer small cats being killed, according to a new study by researchers from the Mizoram University.

MEGAPORT IN ECO-SENSITIVE ZONE AT VADHAVAN, MAHARASHTRA

A major greenfield offshore port at Vadhavan in the ecosensitive Dahanu zone in Maharashtra has received a no-objection certificate from the local Dahanu Taluka Environment Protection Authority (DTEPA), allowing the project to move forward. The project would be India's 13th major port and the first 'mega' port, potentially handling 254 million tonnes (mt) of cargo. The project involves the 'reclamation' of 1,473 hectares (14.73 sq. km.) of land from the Arabian Sea. The MoEFCC asked the port authority to conduct a revised EIA after it planned to dredge 200 million cubic metres of soil from a "borrow pit" off the Daman coast, instead of quarrying 80 million cubic metres of fragmented rocks from the Palghar district, as was originally proposed. In February this year, the DTEPA had raised questions on the original EIA submitted by the authority and questioned the rigour of parts of the report. In March, MoEFCC reconstituted the DTEPA committee and excluded the members who had raised concerns. Climate scientists, however opine that such mega investments may be better spent to adapt India's existing port infrastructure to make them climate ready.

GRASSLAND RESTORATION ON THE OUTSKIRTS OF PUNE

A new project being conducted by The Grassland Trust and Ashoka Trust for Research in Ecology and the Environment (ATREE) is working to develop a model for restoration of grasslands, starting with a pilot site at Kendur village on the outskirts of Pune. The work involves development of native grass nurseries and plantations. Certain areas are marked for protection, and a rotational grazing system will be introduced to contribute to the project's sustainability by involving local communities. Nearly 17 per cent of India's land cover has been categorised as 'wasteland' by the Wasteland Atlas of India, a report prepared by the Union Ministry for Rural Development. Over 70 per cent of Open Natural Ecosystems (ONEs), which includes grasslands, shrublands, pastureland, and marshy areas, overlap with the areas the government calls 'wastelands'. Yet these are the very habitats that serve as infrastructures to temper the worst impacts of floods and droughts capable of making a shamble of India's economic ambitions.

COURTESY YADVENDRADEV V. JHALA

Herbivores, particularly megaherbivores that are over 1,000 kg. in mass, help control the spread of invasive plants such as lantana. Animals with a broad dietary range may offer nature-based solutions to the spread of invasive species.

MEGAHERBIVORES HELP CONTROL INVASIVE SPECIES OF PLANTS IN INDIAN FORESTS

A new study in the journal *Nature Ecology and Evolution* has found a positive relationship between the abundance of megaherbivores – large herbivores over 1,000 kg. in mass, such as elephants and gaur – and richness and abundance of native plants. Data for the study was gathered in India. Megaherbivores, particularly those with a broad dietary range, may offer nature-based solutions to the spread of invasive species by trampling or otherwise destroying the invasives – something native species have evolved to withstand. However, in dense thickets where the invasive plants, cover over 40 per cent of the area, this positive effect was lost. Smaller and medium-sized herbivores also play similar roles according to studies conducted in other countries.

- THE MIZORAM LEGISLATIVE ASSEMBLY HAS PASSED A RESOLUTION OPPOSING THE RECENTLY-PASSED *FOREST (CONSERVATION) AMENDMENT ACT,* 2023: The state environment minister says the Act poses a risk to their forests, which cover 84 per cent of the state.
- SUPREME COURT ALLOWS CENTRE TO CONSTITUTE A PERMANENT BODY OF EXPERTS ON ENVIRONMENT: The body will replace the Central Empowered Committee (CEC), credited with preventing the conversion of forest lands for decades.
- NATIONAL GREEN HYDROGEN MISSION GIVEN GO-AHEAD BY GOVERNMENT: The mission aims to promote the generation of green hydrogen (hydrogen produced using renewable energy).
- GOVERNMENT TARGETS RESTORATION OF 26 MILLION HECTARES OF FOREST LAND BY 2030: Officials claim India has restored 38 per cent of forest areas lost to mining, restoration of remaining 62 per cent targeted, but this claim has been questioned by some non-government experts.

CLIMATE WATCH

HIGHER INCOMES, INVESTMENTS LINKED WITH HIGHER GHGs

A new study led by researchers from the University of Massachusetts Amherst, reveals that the wealthiest 10 per cent of Americans are responsible for about 40 per cent of the nation's greenhouse gas (GHG) emissions. This spotlights the disproportionate contribution of the affluent to GHG emissions that threaten life on Earth. The study honed in on links between income, particularly from financial investments, and increased carbon emissions. The authors recommended taxing the rich to reduce emissions, rather than blanket approaches based on reducing consumption, which would disproportionately impact the poor. As if to underscore the point, several billionaires and corporations are spending money to promote fossil fuel projects, while cold-bloodedly propagating anti-climate change propaganda. Check out this link that reveals how two brothers from Texas, made billions from fracking, funded climate denialism through the media, and pro-fossil fuel policies.

TIGER RESERVES HAVE POOR CLIMATE ACTION INDICATORS

A detailed report by the Wildlife Institute of India and the National Tiger Conservation Authority, titled *Management Effectiveness Evaluation* (MEE) *of tiger reserves in India, 2022* (Fifth Cycle), evaluated the performance of 51 tiger reserves in the country on the basis of indicators that included planning, outputs and outcomes. While tiger reserves have seen an improvement in overall scores over the years, the recent report highlights the worst performing indicator in the analysis, receiving the lowest score – carbon capture and climate change. While Protected Areas indirectly contribute to carbon capture by arresting deforestation and increased forest cover, the lack of a specific mandate towards climate action, coupled with inadequate budget allocations has resulted in India's tiger reserves lagging behind in this indicator. A recent study in Nature Ecology and Environment has estimated that protection of habitats in tiger reserves has prevented the emission of one million tonnes of CO_2 into the atmosphere.

HIGHER ATMOSPHERIC CARBON REDUCES CROP NUTRITION

A review article published in the journal *Trends in Plant Science* shows that plants grown under conditions of higher concentrations of CO_2 have reduced vitamin, mineral and protein content. As CO_2 concentrations increase, plants increase their rate of photosynthesis, resulting in an increase in biomass. To meet this demand, plants must draw more nutrients from the soil. While this phenomenon was first recorded two decades ago, growing evidence points to risks to food security if emissions continue to rise. Global warming is also expected to reduce crop yields in the coming decades, by three to 12 per cent. Over 700 million people were undernourished globally in 2022, of which an astounding 220 million are in India. Although the number of undernourished people in India has been reducing, climate shocks and impacts on agriculture could have grave consequences for our food security in the months and years ahead.

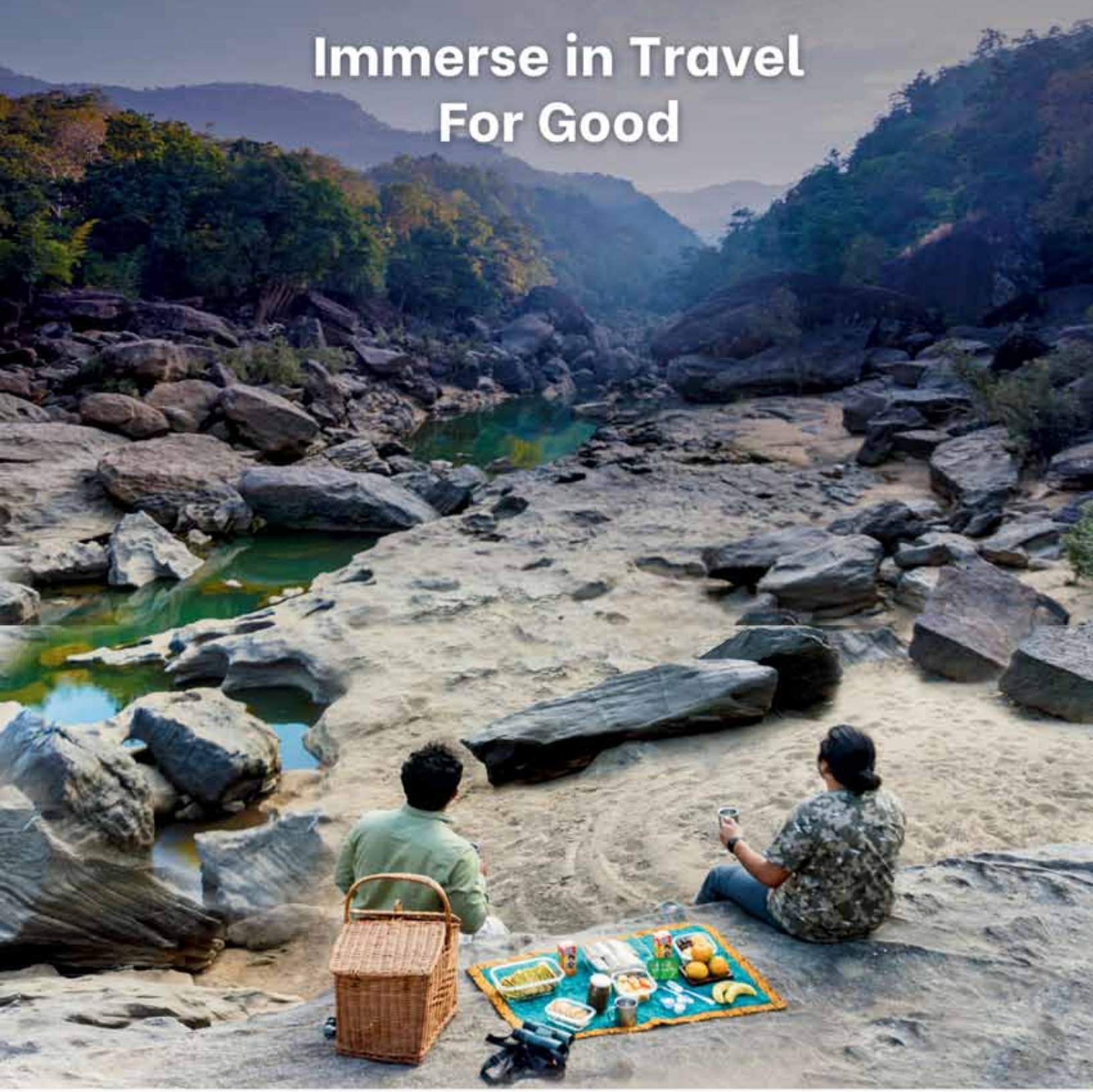
PUBLIC DOMAIN/BRUCE GORDON

In areas of heavy shale-drilling/hydraulic fracturing, dense webs of roads and pipelines fragment contiguous forests and grasslands. Billionaires and corporations that promote fossil fuel projects, consider this acceptable collateral damage.

WITH RISING TEMPERATURES, CROP PESTS BECOME MORE DANGEROUS

With average global temperatures rising, crop pests such as tea mosquito bugs are spreading to higher elevations and regions where they were not earlier present. Farmers, often unable to identify these new pests, cannot counter them before they destroy their crops. A 2013 paper predicted that warming will likely cause an increase in pest attacks on staple crops such as wheat, rice, maize, sorghum, vegetables and oilseeds in India. Pests such as mealy bugs, cereal aphids, and plant hoppers were specifically identified as greater threats. Studies suggest that high temperatures in spring lead to earlier hatching of aphids and, in some areas, warmer winters allowed aphids to extend their lifespan. India may well see an expansion of pest ranges by 200 km. northwards and up to 40 m. higher in elevation.

- UAE PLEDGES BILLIONS FOR GREEN ENERGY DEVELOPMENT AT AFRICA CLIMATE SUMMIT 2023: The summit took place days after Kenya passed a law to establish and regulate carbon markets in the country.
- DECREASING RED MEAT INTAKE AND EATING MORE LEGUMES ENSURES SUFFICIENT PROTEIN INTAKE: Animal farming contributes to high carbon emissions, and studies confirm that reducing red meat consumption is possible without impacting protein requirements.
- INDIA HAD THE DRIEST AUGUST IN 123 YEARS: The 12-day break in the monsoon, the third-longest this century, contributed to reduced rainfall in August.
- RESEARCHERS DEVELOP A NEW TOOL TO MODEL WILDLIFE RISKS: The tool, REBURN, models wildfire dynamics across landscapes under different management strategies, and can help foresters make decisions regarding wildfire management.



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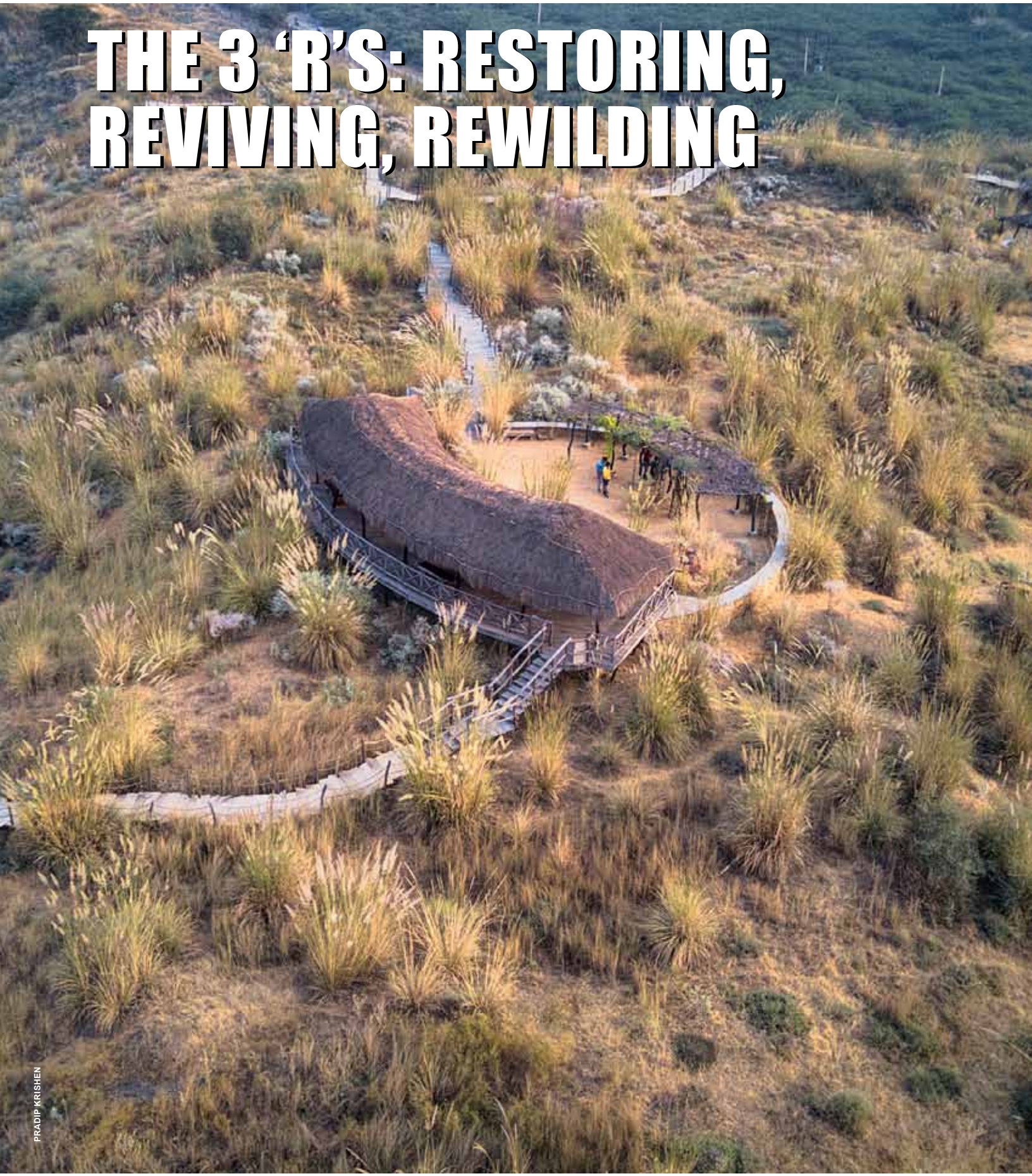
THE 3 'R'S: RESTORING, REVIVING, REWILDING



PRADIP KRISHEN

Rewilding is a fairly nascent phenomenon in India. The earliest known attempt at rewilding a species or habitat dates back to the 1930s, when Maharawal Lakshman Singh attempted to reintroduce tigers to Durgapur in Bengal. Another reintroduction of a large carnivore was attempted in 1958 when three Asiatic lions (a male and two females) were relocated from Gujarat to the Chandra Prabha Wildlife Sanctuary in Uttar Pradesh. In each of these cases, the big cats reproduced and the populations began to increase until, eventually, a lack of protection and monitoring, led to reduced protection, imbalanced predator-prey ratios and human-animal conflict.

However, there was more success in Manas, in Northeast India. Here, in 2008, the first rhino was reintroduced from the Kaziranga National Park. The battle to restore Manas was not easy. Alternative non-forest livelihoods were created, and poachers were encouraged and assisted to turn into protectors. Ensuring the well-being of the rhinos meant going beyond the animals themselves; it meant ensuring a healthy grassland, which in turn would provide good habitat for endangered species such as the pygmy hog and Bengal Florican. A decade and a half since the first rhino was reintroduced to Manas (see page 15), the success of the programme acts as a blueprint for other restoration and reintroduction projects, serving as a reminder of the importance of community involvement in any conservation effort. Today, local communities are proud and protective of 'their' rhinos – no doubt a leading cause of the success of the programme.

A lack of clear boundaries between Protected Areas and human-dominated landscapes in India and a propensity for mindless tree-planting, makes rewilding a complex uphill battle, requiring vision and nuanced policy making. Depicted here is a photographic compilation of some successful (and not-so-successful) attempts at rewilding landscapes and species in India.

Call of the (Re)Wild: Rewilding is eponymous with the name Pradip Krishen in India. His seminal work of 12 years is the stunning ecological restoration of the Rao Jodha Desert Rock Park in Jodhpur, Rajasthan. Pictured here is Kishan Bagh, another restoration project led by him in Jaipur since 2016. The restored *roee* landscape is a shrubland habitat native to the Thar desert. An elevated 800 m.-long wooden boardwalk gives an insight into the sand dune ecology, which includes various xerophytic plants, and desert animals, birds and insects.

PRADIP KRISHEN

A Desert Showcase: The same landscape, now restored (previous page), bears scant resemblance to its original, degraded (above) *avatar* eight years ago. Kishan Bagh is a sprawling sand dune-covered area nestled at the base of the Nahargarh hill, which likely acted as a barrier and allowed the sands to accumulate. Once a barren wasteland with nearly all shrubs and herbs grazed or trodden by livestock and wild animals, with a little care and much effort, the ravine-like landscape has metamorphosed into a showcase of the unique endemic desert ecosystem, in the heart of the city. An open-air museum, the restored site now educates locals and tourists on the importance of native desert species, their natural history and of our ability to work with nature to restore our biodiversity.

PRATIK BANERJEE/SANCTUARY PHOTOLIBRARY

Phoenix from the Ashes: What does it take to bring back a unicorn? Caught in the crossfire of human strife, the last one-horned rhino *Rhinoceros unicornis* disappeared from the Manas Tiger Reserve in 1996. Since then, with protection and community support, the magnificent Manas landscape, its biodiversity and the rhino have risen like the proverbial phoenix from the ashes. This miraculous recovery did not happen overnight – it took years of consistent effort, local community participation and involvement. The translocation of adult rhinos from other areas to Manas was only possible after its habitat was rewilded in the manner that emulated the strategies laid down by Project Tiger.

SHRADDHA GOGOI

Going the Whole Hog: A tiny suid trundles through the dense grass, a symbol of international collaboration to preserve a species. The critically endangered pygmy hog *Porcula salvania* is the smallest and rarest species of pig in the world, endemic to the Indian subcontinent. Once feared extinct after going unreported for nearly two decades, it was 'rediscovered' in 1971 in two separate locations in Assam, including Manas National Park. However, left unprotected and with accelerated habitat, the species was extirpated from most of its range. A captive breeding programme was launched in 1995 in Manas, with six individual hogs. Over the ensuing decades, dozens of pygmy hogs have been reintroduced to the Sonai-Rupai and Barnadi Wildlife Sanctuaries, Orang National Park, and Manas – all natural habitats that were rewilded, or protected effectively. Today the population numbers around 250 mature individuals.

SELVA SEKAR/SANCTUARY PHOTOLIBRARY

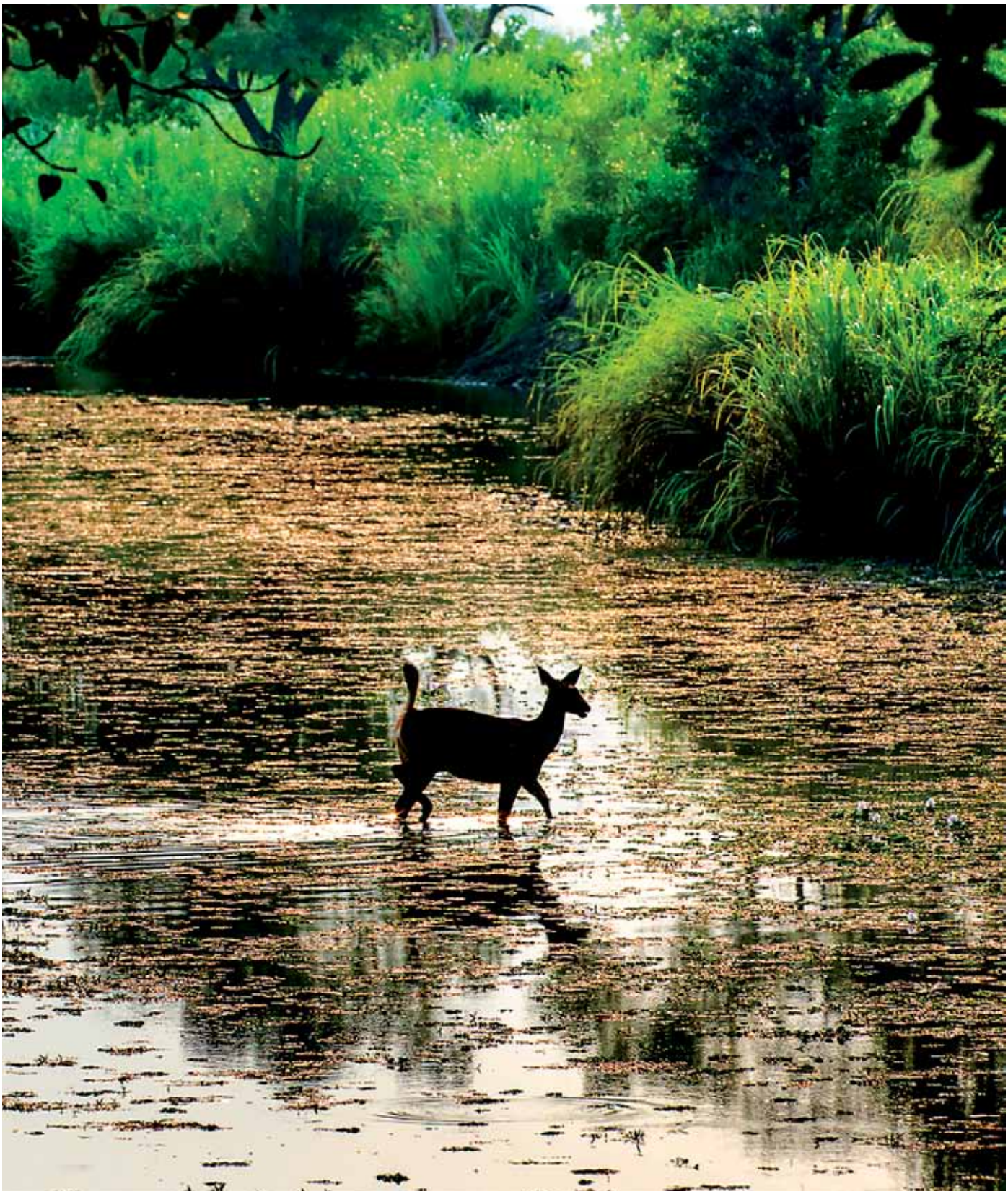
This *Bos* Needs Protection: The largest extant bovid species in the world, the gaur *Bos gaurus* inhabits evergreen, semi-evergreen and moist deciduous forests in India. Despite its large range, this, the largest wild ox in the world, is vulnerable to extinction. In fact, local extinctions took place in three Protected Areas in India – Thattekad Wildlife Sanctuary, Bandhavgarh Tiger Reserve and Kanger Valley National Park – over the last two decades, indicating the urgent need to protect the species across its range. Gaur reintroduction projects have been taken up, including in the Bandhavgarh Tiger Reserve in 2011. Megaherbivores such as gaur are important ecosystem engineers, playing several roles including the removal of invasive species.

ARUN KRISHNA/SANCTUARY PHOTOLIBRARY

SUBHAJIT PAUL/SANCTUARY PHOTOLIBRARY

A Web of Life: A strategically-fabricated giant wood spider *Nephila pilipes* web (top) stretches between foliage in the Bandipur National Park. A rhinoceros beetle *Dynastinae* (above) trundles across a tree trunk in Banarhat, West Bengal. Spiders control insect and pest populations across varied ecosystems. To date India has documented as many as 63,000 insect species (of which nearly a third are endemic), with more being discovered every year. Any effort to rewild, or restore wildernesses must ensure the health of microfauna in the ecosystem. Microbes and invertebrates make up a vast chunk of biodiversity and biomass; ignoring them could have dramatic consequences for the environment. It is vital to understand their role and where required, consider their active reintroduction post-restoration to strengthen ecosystem function and biodiversity health.

SAMSUL HUDA PATGIRI/SANCTUARY PHOTOLIBRARY



Return of the Deer: The eastern swamp deer *Rucervus duvaucelii ranjitsinhi*, or barasingha, once boasted a healthy population in Protected Areas in Assam, but politico-ethnic disturbances pushed them towards extinction in the 1980s. With the protection of Kaziranga's grasslands, the deer populations began to rise. At last count, over 800 individuals have made the grasslands their home with some dispersing beyond the park's boundaries. Some deer were reintroduced into Manas to maintain a separate population of the species, which are vulnerable to the more intense and frequent flooding of Kaziranga. Today, Manas has a relatively stable population of over 120 individuals and will hopefully serve as vital prey for apex predators such as tigers and leopards.

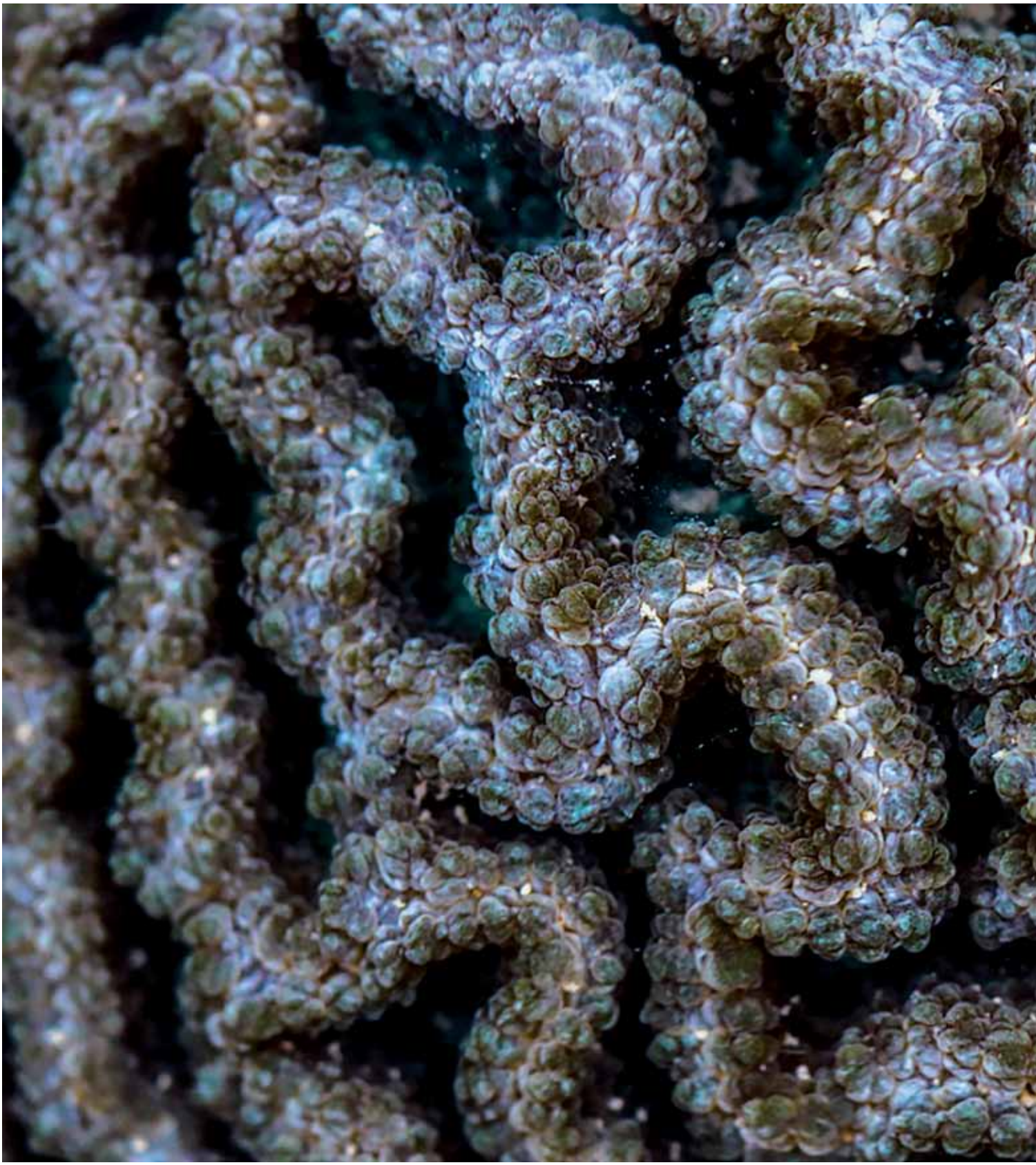
DHRITIMAN MUKHERJEE

Hope is the Thing with Feathers: The devastating crash in Gyps vulture populations in the 1990s owing to the veterinary use of diclofenac is well-recorded, with the once-ubiquitous birds becoming a rarity. With these keystone species facing extinction, the Bombay Natural History Society (BNHS) set up four breeding centres for Gyps vultures across the country. These cutting-edge centres and the work done by the team, led by Dr. Vibhu Prakash, led to the successful captive breeding of three species of Gyps vultures – the White-backed Vulture *Gyps bengalensis*, Long-billed Vulture *Gyps indicus* and Slender-billed Vulture *Gyps tenuirostris*. The Vulture Conservation programme of the BNHS also establishes Vulture Safe Zones. Over 600 vultures have been successfully reared at these centres, and the work to reintroduce them to the wild by the BNHS is ongoing.

JIGNESH GADA/SANCTUARY PHOTOLIBRARY

Leaping into an Unknown Future: The Panna Tiger Reserve lost its roar in 2009, when its population of around 40 tigers were virtually wiped out. This followed closely on the heels of Sariska losing all its tigers to poaching in 2008. With a new administration, a programme to reintroduce tigers to Panna began with the translocation of two females from the Bandhavgarh and Kanha Tiger Reserves, in 2009. The project was led by R. Sreenivasa Murthy IFS and today, Panna's tiger population numbers are estimated to be between 55 to 60 adults prowling the emerald forests.

ROHIT PANSARE/SANCTUARY PHOTOLIBRARY



Rainforests of the Sea: With climate change heating up the oceans, the mass bleaching events of coral reefs are heartbreakingly common. This makes the restoration of coral reefs an even more urgent endeavour. The Coral Reef Recovery Project, a collaborative effort between the Wildlife Trust of India (WTI) and the Gujarat Forest Department launched in 2008, is working on restoring the Mithapur Reef. The work at Mithapur, in the Gulf of Kutchh, includes coral transplantation and encouraging the natural recruitment of corals.

DHRITIMAN MUKHERJEE

Rewilding the Ocean Floor One Seagrass Meadow at a Time: Seagrass beds that occur along coastal India are threatened by crude bottom trawling that destroys the substrate upon which the grasses grow. Seagrasses trap fine sediment and ensure crystal waters in which dugongs and sea turtles are able to feed. They also act as nurseries for countless fish and marine invertebrates. Restoring degraded seagrass beds is being undertaken in the Gulf of Mannar, by the manual transplantation of seagrass sprigs – no mean feat when you're doing it underwater, buffeted by waves! The seagrass restoration project, is being carried out by researchers from the Suganthi Devadason Marine Research Institute (SDMRI), and initial indications are that the transplantation sites are recovering satisfactorily, with an increase in density of macrofauna and fish.

Nature Needs Half

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THE FALSE ASHOKA COMPLACENCY

(and Other Stories)

THE REWILDERS


VIJAY DHASMANA

ABOVE *As part of the ecological restoration plan for Aravali Biodiversity Park, seeds were collected from remnant natural forests and vegetated areas in Mangar, Nahargarh and Kumbhalgarh in the Aravali Range, and two nurseries were established to raise seedlings.*

FACING PAGE *Planting activities during the monsoon at the Aravali Biodiversity Park, in the midst of Gurugram. The Aravali Biodiversity Park could well have been just another mishmash of misplaced tree-planting zeal, but the efforts of the last 12 years have ensured that it is indeed an actual forest, albeit a very young one.*

By Pranav Capila

DON'T ASK, DON'T TELL

On June 5th, World Environment Day, my neighbourhood Residents Welfare Association (RWA) planted 300 Ashoka trees in a carefully regimented deployment around the colony. Photographs of the Visiting Dignitary planting saplings were taken, backs were patted, congratulatory messages about 'green warriors' and 'environmental consciousness' pinged to and fro on the official WhatsApp group.

Ashokas are not native to India's National Capital Region, where I live. They are, in fact, not even Ashokas – that is, they are not *Saraca asoca*, the vulnerable rainforest species with roots sunk deep into Indian mythology and history, but *Monoon longifolium*, also known as the 'False Ashoka'. It doesn't matter. Like a lie told often enough, the False Ashoka has now become the Ashoka. And true or false, endemic or exotic, a tree is a tree. And planting trees is good for the environment.

So, plant a tree. Plant many trees. What trees, why and where? Don't think about it. Why would you, when the people who really ought to, aren't? There's a movement for mindless tree-planting raging through the country. People are doing it. Forest Departments are doing it. Corporates are funding it. Governments are extremely happy with it. Join in; the mindlessness is precisely the point.

Once you accept that a tree is a tree, you can accept that a collection of trees is a forest. A grove is a forest, an orchard is a forest, a plantation is a forest. A zoo is a forest, a safari park is a forest, heck, even your neighbourhood park can be a forest, as long as it seems sufficiently so via satellite. Accept that India's forest cover is increasing, one monoculture plantation at a time. Accept that laws sanctioning mass forest diversions can be passed without a whimper, because a safari park in Haryana will compensate for the destruction of an old-growth rainforest in the Andamans. Accept that you can consume your forests and have them too. *Compensatio erat demonstrandum.*

Don't say that a lot of the forests that are being planted to 'compensate' for natural forest loss, or positioned as carbon credits that can be bought by companies to offset emissions, aren't actually forests. Don't even read the title of that study in *Nature* ('Restoring natural forests is the best way to remove atmospheric carbon', April 2019), which revealed that almost half (45 per cent) of the areas that countries have pledged to restore to combat global warming are set to become plantations of commercial trees. ("There is a scandal here," lead author Simon Lewis of the University College, London was quoted as saying. "To most people, forest restoration means bringing back natural forests, but policy makers are calling vast monocultures 'forest restoration'. And worse, the advertised climate benefits are absent.")

Don't say that the 'reforestation' of degraded natural forests with fast-growing monoculture plantations is tantamount to creating green deserts owing to the limited biodiversity they will sustain. Don't say that the 'afforestation' of open natural ecosystems such as scrublands, grasslands and wetlands is "an incongruous disturbance and, indeed, an impending ecological disaster" (Fernandez, GW, et. al., Perspectives in Ecology and Conservation, July-Dec 2016). Don't point to the 2022 analysis (Rana P., et al., 'Predicting wasteful spending in tree planting programmes in Indian Himalaya'; *World Development*; June 2022) that found that "tree planting programmes involve considerable wasted expenditure on ineffective plantations, [raising] questions about optimistic assessments of [their] potential to serve as a cost-effective natural climate solution". India has pledged to restore 21 million hectares of forest by 2030 under the Bonn Challenge. Don't you want us to win?

Don't say that actually 'Preventing, Halting and Reversing Loss of Nature' (the slogan of the United Nations Decade on Ecosystem Restoration) requires scientifically robust restoration projects attuned to each ecosystem and ecoregion. Projects such as the ones featured in the pages here, that are working to reverse degradation, recover biodiversity and restore ecosystem services, in close cooperation with local communities. Don't, whatever you do, read about them.

THE FOREST IN MY BACKYARD

There's a forest in my backyard that I had never visited until a few months ago, probably because I never thought of it as a forest. I mean, sure, the 158 ha. Aravali Biodiversity Park (ABDP) was once an abandoned mining site, dry and degraded, and now there are trees and shrubs and grasses. But some park in Gurgaon of all places can't be compared to a real forest. Can it?

Rewilder and eco-restoration practitioner Vijay Dhasmana receives my cynicism towards the city forest he has curated with good humour. The Aravali Biodiversity Park could well have been just another mishmash of misplaced tree-planting zeal, but the efforts of the last 12 years have ensured that it is indeed an actual forest, albeit a very young one.

In 2010, when Dhasmana was approached by the citizen-led movement IAmGurgaon (IAG), their excitement was about planting a million native trees – although their concept of 'native' was not very clearly defined. Dhasmana asked them to take a step back. "I took them to Mangar Bani, Jhir, Sariska... different parts of the Northern Aravalis," he says, "and told them, look, it won't be just about trees, it will be about restoring the land to its original shape."

ATAL KAPOOR

VIJAY DHASMANA

IAG listened. And although the sponsorship money still came for tree planting (an easier CSR sell), a nuanced plan for ecological restoration came into being. Reference sites were studied to see how different species supported one another in various tiers of the Northern Tropical Dry Deciduous and Northern Tropical Thorn Forest ecosystems, which are characteristic of the region. An inventory of over 200 desirable native species of trees, shrubs, climbers and grasses was made. Climax species were identified – Indian frankincense *Boswellia serrata* and the *dhok* tree *Anogeissus pendula* on the rocky hills; *dhak* tree *Butea monosperma* dominated mixed deciduous patches in sandy and gravel areas; and saccharum-phoenix savannahs in the periodically inundated areas – to envisage how the forest, once mature, undisturbed and self-sustaining, would manifest in the decades to come. Seeds were collected from remnant natural forests and vegetated areas in Mangar, Nahargarh and Kumbhalgarh in the Aravali Range, and two nurseries were established to raise seedlings. Invasive alien species such as the *vilayati kikkar* tree *Prosopis juliflora* were removed and native seedlings planted.

"We also made some mistakes along the way," Dhasmana says as we walk through off-path areas of the ABDP on a muggy June morning. He points to an *indrajau* tree *Holarrhena pubescens*: "You can see this one isn't flowering; we planted it with the pioneer species but it needs canopy cover; it should have come in when the forest was more mature."

We walk by a saccharum patch, sending a monitor lizard scuttling to safety, then halfway up a ridge where the rocky perch of an Indian Eagle-owl *Bubo bengalensis* is littered with the bones of its prey, then up to the top, with Indian frankincense growing on the brow ("the way you see it in Mangar Bani") and a *dhok* forest patch behind ("now quite dense"). He points to a *Boswellia* seedling sprouting from a crack in a rock: "This is natural recruitment. Its seed would have dispersed, lodged here and sprouted. See how happily it has survived the

TOP LEFT *A cliff in the Aravali Biodiversity Park, 2010.*
BOTTOM LEFT *The same cliff in 2020.*

harsh summer in these rocks!" The native plants in ABDP are naturally hardy and doing quite well, but at 10 years, this forest is still in its infancy. "As the forest matures, we will have to continuously study it to see what's growing and what's not, how it reacts to particularly dry or wet years, and how its natural cycles unfold. When you plan a climax forest you hope that the forest, with the human disturbance removed, with invasives managed, will sustain itself. It will become stable. But monitoring it over large timescales is a resource intensive task, and the timescales in ecological restoration are always very large."

In 2022, the IUCN declared ABDP India's first other effective area-based conservation measures (OECM) site, indicating an area that is not protected but supports a rich biodiversity.

Apart from its floral wealth, the park supports several mammal species, including golden jackals, jungle cats, nilgai, flying foxes, grey mongoose, small Indian civets and Indian hares. It is also an eBird hotspot with over 206 avian species recorded so far, boasts a variety of reptiles, and has a rich invertebrate diversity too.

ABDP's success has led to other projects for The Rewilders, Dhasmana's organisation. These include Aravali Nagar Van, a 72 ha. area a stone's throw from ABDP where Prosopis patches are gradually being thinned out and the Northern Aravali forest community of plants reintroduced; a 90-acre site in Sikandarpur, encompassing rocky outcrops and '*bhood*' areas (sandy foothills that are vital for groundwater recharge); and two important forest corridors, Chakkarpur-Wazirabad and Badshahpur, in partnership with IAmGurgaon, the Haryana Forest Department and the Gurugram Metropolitan Development Authority.

There is much work being done, and much to be done.

PROTECTED BUT VULNERABLE

The buffer area of the Bandipur Tiger Reserve, like other tiger reserves across the country, has historically faced a lot of biotic pressure. The reserve forests here have been badly denuded by cattle grazing, firewood collection and other human activities.

When Bengaluru-based NGO Junglescapes began working in the Bandipur buffer in 2008, there was no model to follow for ecological restoration in a Protected Area (PA). A pilot project was started on a single hill adjoining a village, in coordination with the village's Eco-Development Committee. Then another village joined in and another hill was taken up. Gradually, organically, the project grew. Fifteen years later, it spans over 1,200 ha. across the buffer and the core.

"The major credit for what we've achieved in Bandipur goes to the local community," says Ramesh Venkataraman, managing trustee of Junglescapes and a Certified Ecological Restoration Practitioner. "Yes, we're providing livelihoods to indigenous people through the restoration work. But that is secondary. The primary outcome is that the reconnection with the forests helps preserve their traditional ecological knowledge."

Marrying the intimate ecological knowledge that Indigenous people have of their environment with high-level scientific knowledge, Venkatraman believes, is crucial to the long-term success of such projects. For instance, Junglescapes worked in the seven square kilometre Lokkere Reserve Forest, which has different types of terrain: hilly slopes, where soil compaction, rainwater run-off and denudation were the major issues, and low-lying areas, where invasives had colonised large portions. The local people knew the soil types in different areas, where water harvesting would (or wouldn't) work, where various native species had historically

BELOW LEFT *An elephant walks through restored areas in the Lokkere Reserve Forest. Ecological restoration in buffer areas can expand wildlife habitats and protect migratory corridors.*

BELOW RIGHT *Grass seed collection by Junglescapes' Indigenous restoration partners. The success of rewilding in this landscape can be attributed to the participation of the local community.*

COURTESY JUNGLESCAPES

COURTESY JUNGLESCAPES

COURTESY JUNGLESCAPES

LEFT *Junglescapes has trained community members to remove lantana through the proven 'cut rootstock method'. Getting native grasses back is the crucial next step, since grasses cover the ground quickly and provide a defence against lantana re-emergence.*

flourished, and where seed-bearing mother trees of desirable species could be found. While scientific knowledge on lantana removal, for example, could be researched, that kind of micro-knowledge about the land could only come from the community.

Junglescapes has trained community members to remove lantana through the proven 'cut rootstock method'. Getting native grasses back, though, is the crucial next step. The grasses cover the ground quickly, alleviate the soil and provide a reasonable defence against lantana re-emergence. Then, the pioneer species can return. The team usually collects grass seeds during the seeding season in January and February. Grass slip transplanting is also performed. While seeds of shrubs, climbers and trees are also collected and planted where required to fill species' gaps, the team has found that once the lantana has been removed and grass cover restored, a lot of regeneration happens on its own. "We've seen that whatever comes back naturally, through Assisted Natural Regeneration, is far more resilient and far more suited to this particular landscape," Venkataraman says.

A survey conducted last year in the dry deciduous forests under restoration revealed that there were now about 350 species of plants, including 100 tree species and 180 herbs and shrubs, apart from climbers, creepers and grasses – a diverse structure representative of the forest type. Forests in Bandipur range from sub-tropical thorn (mainly in the buffer) to predominantly dry deciduous; unlike moist deciduous or rainforests, they are meant to have a lot of open-to-sky area, with a plenitude of grasses and shrubs. Intensive tree-planting drives in such forests can lead to a denser canopy and ecosystem alterations.

Venkataraman believes that there is a lot of work to be done inside PAs around the country. "PAs are legally protected but ecologically vulnerable," he says. "Scaling up ecological restoration is a major challenge and it is only the government, not individual NGOs, that has the capacity to implement projects at a scale that makes a difference." For reference, Bandipur is a 912 sq. km. park with lantana having invaded about 50 per cent. Junglescapes has been able to cover about 1,200 ha. (12 sq. km.) in 15 years: an impressive figure in itself, but a tiny percentage in the larger scheme of things.

Forest degradation in PAs is one of the reasons why wildlife, including megafauna such as tigers and elephants, are being forced into surrounding landscapes, resulting in human-wildlife conflict. Particularly in buffer areas, ecological restoration can improve forest cover, expand available habitats for wildlife, and protect vital migratory corridors. While most restoration projects target areas outside PAs, improving forest quality within them is critical.

KANDALS AND CORALS

In May 2017, while researching a story on elephant corridors in the Brahmagiri-Nilgiris-Eastern Ghats landscape, I made a detour to the coastal backwaters of Kunhimangalam, a small village in the Kannur district of Kerala. Wildlife Trust of India (WTI) had acquired 7.55 ha. of species-rich mangrove habitat here, which in 2016 became the hub for the Kannur Kandal (Mangrove Conservation) Project, aimed at promoting the restoration of mangroves in Kerala by fostering community and government participation.

The project's small nursery at Thuruti was supplying saplings for volunteers to plant, and students from across Kannur regularly visited the Mangrove Interpretation Centre. They learned about the role of mangrove ecosystems as refuges and nurseries for a variety of threatened terrestrial and aquatic species, as an important source of fodder, medicines and firewood for coastal communities, and as buffers against soil erosion, tsunamis and climatic events such as cyclones. They learned, too, how the extent of mangroves in Kerala had reduced drastically over the years, with only 1,750 ha. of an estimated historical 70,000 ha. remaining.

Of these, 755 ha. were in Kannur district, supporting at least 10 species of mangroves, 87 species of fish, 83 species of birds and 13 species of mammals, including the vulnerable smooth-coated otter. The problem was that 90 per cent of this area was under private ownership and was therefore highly threatened.

As I walked the perimeter of the secured *kandals* with project lead Ramith M., I saw very few mangroves remaining on adjacent lands. Instead, there were coconut plantations and ponds for aquaculture, which was being subsidised by the government. On the adjoining Perumba River, Shaju, a local fisherman, told us that his catch of mangrove red snapper had dwindled to nothing; he had been fishing

COURTESY VIMAL/WTI

COURTESY WTI

since childhood and this had been his worst year in living memory.

In the years since I visited, the Kannur Kandal Project, supported by the Kerala Forest Department and SBI Foundation, has provided greater impetus to its restoration activities. Three panchayats in Kannur have now provided permission for mangrove restoration in their areas and surveys are being conducted to identify degraded sites. Capacity building of local fisherfolk, forest department personnel, school and college students, and other volunteers in restoration planting is also ongoing. Further, a Central Mangrove Nursery with a capacity of one lakh saplings is being created, which will have all 18 true mangrove species (and a few mangrove associates) of Kerala. The aim is to restore 12 ha. of degraded areas in Kannur over the next two years, and 40 ha. in the longer term. The broader plan is to establish a model for the securement and restoration of mangrove areas that can be scaled up and implemented across Kerala and elsewhere.

A MARINE REWILDING

Another WTI project that I hope to visit soon, a joint venture with the Gujarat Forest Department, is working to recover the degraded Mithapur coral reef that lies 12 km. south of the Gulf of Kutchh in Gujarat. Restoration activities are being undertaken over a 500 ha. area, with a long-term goal to restore 1,200 ha.

Coral reefs, also known as the rainforests of the seas, are among the most threatened ecosystems on the planet. They are hotbeds of biodiversity, serving as shelter, reproduction, feeding and nursery areas for an estimated 25 per cent of all marine species. They also play a key role in climate adaptation: a meta-analysis published by *Nature* in 2014 on the effectiveness of coral reefs for coastal hazard risk reduction and adaptation revealed that they reduce wave energy by an average of 97 per cent. In addition, they create livelihood opportunities for coastal communities through fisheries and tourism. Figures released in 2018 by the United Nations Environment Programme (UNEP) as part of a 'coral reef funding analysis' estimated that coral reef ecosystems "provide society with resources and services worth $375 billion per year".

The Mithapur Coral Reef Recovery Project has previously reintroduced two locally extinct species through an unprecedented transplantation from donor sites in Lakshadweep. The most recent restoration activities have involved the use of Biorock, a mineral accretion technology used to make robust artificial reef structures on which corals can grow at rapid rates.

ABOVE LEFT *Mangrove planting at the Kannur Kandal Project. Three panchayats in Kannur have given permission for mangrove restoration in their areas and surveys are being conducted to identify degraded sites.*

ABOVE RIGHT *A mangrove planting drive on the Perumba River. The Perumba has been losing its native biodiversity as mangrove areas have been replaced by coconut plantations, aquaculture ponds and human infrastructure over the years.*

BY THE PEOPLE

The village of Changlangshu lies on the eastern edge of Nagaland, about halfway up the palm that India cups to Myanmar's cheek. A long time ago it was surrounded by dense community-owned forests, but no longer, not for many years now.

As the human population grew, more and more forest land was appropriated for settlements, logging and *jhum* (shifting) cultivation. The forests that remained were fragmented into small, disconnected patches that became degraded over time. Members of the Indigenous *Konyak* tribe noticed that many of the wild herbs and plants that they had used – in their food, medicines or various cultural practices – were disappearing. So too were the birds and animals that formed an intrinsic part of their folklore. Rainwater run-off from the now-exposed hill slopes had also led to the depletion of water tables, resulting in a water crisis. But there were more mouths to feed, so more forests were cleared. The fallow cycles of *jhum* grew shorter, giving the forests almost no time to regenerate.

An interest in wildlife filmmaking led Wanmei Konyak, who once used to hunt in these forests, to a Green Hub fellowship in

COURTESY CHANGLANGSHU BMC

COURTESY CHANGLANGSHU BMC

ABOVE LEFT *The current Changlangshu Biodiversity Management Committee (BMC) restoration site (at the top of the denuded hill). The BMC is working long-term towards connecting three small forest patches by restoring the fallow* jhum *lands that lie between them, forming a single permanent forest area of around 100 ha.*

ABOVE RIGHT *The protected saplings at the Changlangshu BMC restoration site.*

2015-16. Successive internships with Wildlife Trust of India (WTI) and the Wildlife Institute of India (WII) followed, nurturing an incipient interest in conservation. In 2018, when Green Hub began its 'Youth for Forest' initiative, creating small grants for alumni who had shown an interest in working on biodiversity conservation within their communities, Wanmei was the first recipient.

Along with a group of friends, he formed a Biodiversity Management Committee (BMC) in the village. "When we started out, we didn't have a designated area for restoration activities," he says. "We were just planting saplings along roads near the forests. Every piece of land in Changlangshu is owned by individuals or clans, and since there was no precedent here for the kind of work we were doing, it was difficult to make people understand."

The BMC team began attending Village Council meetings and speaking to community leaders about the need for biodiversity conservation. Restrictions were sought, and eventually granted, on hunting in community forest lands. A senior member of the community donated a patch of degraded forest, formerly a resting area for migratory birds, to the BMC for restoration. The Village Council also helped set up a nursery for native plants at the primary health centre. By 2019, the team had started planting saplings on the donated land. As awareness about their work grew, other members of the community began to donate their *jhum* lands to the BMC.

Green Hub has provided constant support, providing regular access to training in aspects of ecological restoration for the BMC and other interested members of the community. The project is also receiving financial support through a Green Hub-Royal Enfield Small Grant. The Nature Conservation Foundation and the Ecological Restoration Alliance (ERA) have provided scientific expertise.

BELOW *Community members planting seedlings in the BMC nursery. As awareness about the restoration work has grown, more members have donated their* jhum *lands to the BMC.*

COURTESY CHANGLANGSHU BMC

The current area under restoration is about 1.5 ha., with 3,000 saplings having been planted. The BMC is working long-term towards connecting three small forest patches – Eaknyak forest, Langkea forest and Obajung forest – by restoring the fallow *jhum* lands that lie between them, forming a single permanent forest area of around 100 ha. Agreements have been reached with the landowners through the Village Council and Changlangshu Students' Union: the forest and its resources will be managed by the BMC, which will also promote eco-tourism in the area. Any benefits that flow from the venture will be shared with the landowners and the owners of the community forest.

"Ecological restoration is a long and slow process of creating and healing a forest," Wanmei says. "Our work in the restoration area must continue in the long-term for it to make any significant impact on the forest areas around the village. But our team is deeply committed to this work. We were once just a handful of people, now we are more than 30. More will join us. These forests are our community's future."

With thanks to Nayantara Siruguri.

ALL ROADS LEAD TO VALPARAI

I have a box cutter, a trowel and a pocketful of blue tags. I have this hole in the forest floor in front of me and this sapling in a nursery bag beside it. I have… no confidence.

This isn't some garden variety sapling that I'm planting. If I manage to not kill it in this moment, it will grow, over decades, into a tall, proud rainforest tree. The sweat beading my brow has little to do with the mid-July humidity.

I am in Varattuparai, in a small rainforest fragment on the Valparai Plateau in Tamil Nadu's Anamalai Hills. Nature Conservation Foundation (NCF) is restoring this degraded fragment, which falls within a Tata Coffee plantation, as part of its long-running Anamalai Rainforest Restoration Project. The project is supported by Rohini Nilekani Philanthropies, Rainmatter Foundation and the AMM Murugappa Chettiar Research Centre.

Yesterday, at the project's nursery (also in Varattuparai, on Tata Coffee land), NCF project manager Kshama Bhat guided me through the two- to five-year journey that saplings typically take before they're deemed ready to plant. It begins, as such journeys do, with a seed.

The seeds are regularly collected, or "rescued" as Kshama puts it, from the margins between rainforest fragments and the commercial plantations that have colonised most of the Valparai Plateau. They are also picked up from civet and bear scat, under hornbill nests and bat roosts, and along the project's phenology trail within the Anamalai Tiger Reserve (from tar roads, where they wouldn't survive). They are brought to the nursery, washed, and sowed in a mixture of rainforest soil, bio-compost and coco peat. About 150 of the 400-odd tree species found in the Anamalai Mid-Elevation Wet Evergreen Forests have been successfully grown at the nursery. Diverse tiers of the rainforest, from shrub layer to overstory, are all represented here.

Over 3,000 saplings were planted in restoration plots over the last couple of weeks; another 2,000 will go out soon. The small plot in which we planted 250 saplings this afternoon is part of a 15 to 20 ha. patch of rainforest. This fragment is important for animal movement; it connects to the tiger reserve just past the river and to fragments on the other side. It's a preferred location for Great Hornbills and there's a troop of lion-tailed macaques in the area.

NCF has mapped around 50 such fragments across the plateau, of which 34 (~1,120 ha.) are being protected through MoUs with Parry Agro Industries Ltd. and Tata Coffee Ltd. An area of about 100 ha. has been targeted for active restoration efforts across 28 fragments: 80 hectares has been weeded and planted with a high diversity of species, with 20 hectares weeded for assisted natural regeneration and direct seeding experiments.

SIZE DOESN'T MATTER

Some of the fragments are very small (0.3 ha.) and the forest is quite degraded – open canopy, proliferation of invasive species, decline in native plant diversity, lack of seed dispersers – but there is still significantly greater biodiversity here than in the surrounding green deserts, the commercial plantations. "Size doesn't matter, quality does," declares NCF programme manager Srinivasan Kasinathan. "These fragments still have a lot of biodiversity value and are movement corridors for wildlife. The idea is to restore them with reference to our

BELOW *A leopard spotted in the Anamalai Tiger Reserve.*

P JEGANATHAN

COURTESY VIJAY KARTHICK

PRANAV CAPILA

benchmark sites in the tiger reserve, which is a relatively undisturbed, mature old-growth forest."

We explore several restoration plots over the next few days and visit the Candura fragment in Parry Agro's Murugalli Estate, where an interesting comparison between various restoration methodologies (active restoration, natural regeneration, assisted natural regeneration) is being conducted on different plots. A control plot has also been established in the secondary forest here and variables such as stand density, species richness, carbon storage and natural regeneration are being assessed there as in the experimental plots. Finally, we visit the Manambolli benchmark site within the Anamalai Tiger Reserve, where the trees are taller, denser and more diverse and the canopy closes out the sky. This is the rainforest as it once was, all across the plateau.

Monitoring conducted on restored plots seven to 15 years after planting indicates that active restoration has led to better recovery than passive restoration in comparable sites, in terms of better canopy cover, tree density and species density, as well as compositional similarity to the benchmark sites in Anamalai TR. Aboveground carbon storage in actively restored forests has been measured at 143.9 Mg/ha (mean value), relative to naturally regenerating sites (49.0 Mg/ha) and benchmark rainforests (287.6 Mg/ha). Recent research has also shown that the actively restored sites support a greater diversity of rainforest birds and have a greater similarity to the bird community composition in benchmark rainforests.

BUILDING AN ALLIANCE

One morning, I tag along as NCF senior scientists Divya Mudappa and T.R. Shankar Raman, who started the Anamalai Rainforest Restoration Project over two decades ago, visit one of the larger coffee estates on the plateau. We meet the estate manager, who talks about his plan to plant 10,000 trees on the estate (arabica coffee is shade-grown) under the Tamil Nadu Green Mission. Wonderful, except the saplings he's buying are all exotics: mahogany and silver oak. He also wants to plant eucalyptus and red gum to dry up the swamps in the low-lying areas of the estate, because they're "too slushy".

Divya patiently explains that swamps are vital for the water table, especially with the reduced rainfall in recent years. Besides, the elephants and gaur that feed in such areas will be forced to move to other parts of the estate, potentially increasing conflict. As for shade trees, ensuring a diversity of native species, which are more resilient, will prevent mass die-offs on account of infection or extreme weather.

Shankar later tells me that the Forest Department has been distributing silver oaks to plantation owners in the Nilgiris to "increase tree cover". "It's particularly important to get the Forest Departments, not just in Tamil Nadu but across the country, to move away from behaviours they're entrenched in," he says. "They have hundreds of nurseries with hundreds of thousands of seedlings, but often only a handful of species. If they propagate species inappropriate to their eco-regions, never mind pushing ornamentals and exotics, that's very unfortunate."

ABOVE LEFT *A Malabar gliding frog* Rhacophorus pseudomalabaricus*, a tree frog found in the Anamalai Hills.*

ABOVE RIGHT *NCF's restoration planting team after a morning's work at the Varattuparai site. Monitoring conducted on restored plots seven to 15 years after planting indicates that active restoration has led to better recovery than passive restoration in comparable sites, in terms of better canopy cover, tree density and species density.*

With a view to changing the mindset of both government and civil society entities engaged in (mindless) large-scale tree planting, Divya and Shankar recently joined a group of restoration practitioners in launching the Ecological Restoration Alliance (ERA).

"We come with a certain type of training as scientists, but there are also people, for instance from Indigenous communities, who are working on restoration projects," Divya says. "Or, there are people who are doing parks but in an ecologically sensitive manner, reflecting local biodiversity. We felt that all these approaches had some features and strengths that could be useful to people who are just starting out on projects, or who are setting aside pieces of land, private or corporate."

"No single person or group engaged in ecological restoration can possibly do it at very large scales," Shankar adds. "A better way to do it is for lots of groups to take on smaller areas in which they have a presence and which they are committed to conserving. ERA is trying to create a platform where people can learn what others are doing and possibly apply it in their context."

MOHAMMAD JUNAID

A tigress with her cub in a grassland in the Tadoba-Andhari Tiger Reserve core. Domain expert Dr. Gajanan Muratkar explains that grasses are the architects and engineers of the forest ecosystem – they prevent rainwater run-off, maintain soil nutrient levels, and provide suitable habitats.

GRASS IS FOR TIGERS

Last year, while on assignment with the Tadoba-Andhari Tiger Reserve (TATR) Conservation Foundation, I got a close-quarters view of some of the habitat improvement measures that the TATR management was undertaking within the core area of the reserve. Grassland development is an important part of these measures and a three-year project, funded by the State CAMPA and ICICI Foundation, has recently been initiated with domain expert Dr. Gajanan Muratkar to restore, maintain and improve grassland ecology within the Critical Tiger Habitat.

Dr. Muratkar heads the Botany and Environmental Science Department of the Arts, Science and Commerce College at Chikhaldara, on the edge of the Melghat Tiger Reserve. When we met last year, he was as keen as only a good teacher can be to talk about his favourite subject. "Grasses are the architects and engineers of the forest ecosystem," he explained. "They prevent rainwater run-off, maintain soil nutrient levels, and provide suitable habitat for microbiota as well as grazing, browsing, hiding and breeding habitat for prey and predators."

At TATR, Dr Muratkar has developed a 16-point protocol to ensure the propagation of indigenous grass species, remove ornamental exotics and invasive weeds, foster the growth of wild leguminous plants (which fix biological nitrogen and enrich the soil), and reduce woody species while preserving fruiting trees. He has also recommended that that the Important Value Index of various grassland species be assessed every two years, a germplasm bank of indigenous grass species be established, and capacity building of frontline staff be stepped up.

The project's long-term aim is to increase grassland habitat in the TATR core by about 10 per cent. Already, as a result of these interventions, the grasslands of Jamni, Navegaon and Palasgaon – areas within the core where villages that have been rehabilitated once stood – are now seeing healthy prey populations as well as breeding tigresses.

THE LONG ARC OF TIME

In 2021, the United Nations Environment Programme (UNEP) and the Food and Agriculture Organisation (FAO) released a report detailing the "state of degradation of the world's ecosystems". It revealed that ecosystem degradation affects the well-being of approximately 40 per cent of the world's people, puts up to $577 billion in annual global crop production at risk from pollinator loss and annually causes the loss of ecosystem services worth more than 10 per cent of global economic output.

An IUCN 'Issues Brief' released in February 2021 declared that "halting loss and degradation of forest ecosystems and promoting their restoration have the potential to contribute over one-third of the total climate change mitigation that scientists say is required by 2030 to meet the objectives of the Paris Agreement". A study published in *Nature* ('Global priority areas for ecosystem restoration', Strassburg et. al.) found that "restoring 15 per cent

BELOW *The late Aditya Singh and his wife Poonam bought 35 acres of land adjoining the Ranthambhore Tiger Reserve and successfully rewilded it over the course of 20 years.*

ADITYA SINGH


COURTESY NCF

RIGHT TOP AND MIDDLE *The degraded Injipara rainforest fragment on the Valparai plateau after weeding in 2004 (top) and recently, in 2023 (middle), two decades after restoration work commenced on the fragment.*

RIGHT BOTTOM *A nature education field trip conducted in August 2023 for school children from the Changlangshu Government Primary School.*

of converted lands in priority areas could avoid 60 per cent of expected extinctions while sequestering 299 gigatonnes of CO_2 – 30 per cent of the total CO_2 increase in the atmosphere since the Industrial Revolution. The inclusion of several biomes is key to achieving multiple benefits."

Ecological restoration offers comprehensive, nature-based solutions to conserving biodiversity and stabilising the Earth's climate. However, there are two key caveats in the studies mentioned above: (a) "**halting loss and degradation** and promoting restoration," because while ecological restoration can mitigate the mistakes of the past, it cannot compensate for the mistakes of the future (to believe that would be, once again, missing the forest for the trees), and (b) "the inclusion of **several biomes**," because non-forest, non-terrestrial ecosystems need more attention than they are getting.

What is wonderful about the ecological restoration space is that there is room for a variety of players – for community practitioners such as Wanmei Konyak, scientists such as Divya Mudappa and T.R. Shankar Raman, and self-taught practitioners such as Vijay Dhasmana. There is room for Forest Departments and governments; in fact, it is essential that they get past their tree-planting quick-fix and get on board, since they have the capacity to scale such projects like no individual or private organisation can. There is room for corporates, though a certain re-education is required, since CSR is oriented towards short-term outcomes and the arc of time is long with ecological restoration. There is room for dedicated individuals such as Poonam and Harshwardhan Dhanwate, who let a patch of the Tadoba-Andhari buffer rewild, and the late Aditya Singh and Poonam, who created their own little forest heaven next to Ranthambhore. Someday, when I have acquired sufficient resolve, there will be room for me.


COURTESY NCF

NAYANTARA SIRUGURI

COURTESY OSWALD J. SCHMITZ

The *Sanctuary* Interview

MEET OSWALD J. SCHMITZ

Oastler Professor of Population and Community Ecology, in the Yale University School of the Environment, **Oswald J. Schmitz** *focuses on the linkage between two important components of natural systems: biodiversity and climate. He believes that human stewardship of the planet is about working to preserve species, natural resources and ecosystem services and being mindful of how human activities could influence ecological interdependencies. In this special Rewilding issue of* Sanctuary, *he speaks with* **Lakshmy Raman, Sanctuary Asia**, *on why 'trophic rewilding' alias 'Animating the Carbon Cycle' can address both biodiversity degradation and climate change.*

ABOVE *Oswald J. Schmitz at Algonquin Provincial Park, Ontario, standing by the memorial dedicated to Canadian painter Tom Thomson. Like Thomson, Oswald spent many hours in forests and fields, learning the natural history of these places through passive observation. These early years amidst nature paved the way to formal training on the science of ecological relationships.*

Your expertise ranges from climate science and ecology to ecosystem conservation and the impact of animals on carbon sequestration. What triggered your interests in these areas? I had always been interested in understanding the holism of nature and the relationship between wildlife species and their functioning in ecosystems, and have always had an innate interest in nature and ecology. Growing up, I spent many hours playing in fields and forests and learning the natural history of these places through passive observation – metaphorically osmotic information uptake! But as an undergraduate I had several professors who had a wonderful, formative influence on me to develop a formal scientific approach towards understanding ecological relationships.

The year 2023 recorded some of the highest summer temperatures worldwide, yet the naysayers continue to

deny the reality of the climate crisis... As a scientist, the shattering of temperature records is entirely unsurprising. We already knew this would happen based on climate science done back in the 1990s. The naysayers will always be naysayers; that's human nature. No amount of evidence will change their mind. I don't think anything but extreme suffering will perhaps change their mind. But if they face extreme suffering, then things will likely be too late for all of us. So, as a scientist, I focus on the majority of the people who do worry and care about fixing the climate problem. We owe it to them to help find solutions.

For years, carbon capture and storage in plants and soil has been highlighted as the main climate solution. Can habitat and landscape protection actually prevent climate warming beyond 1.5 °C? Actually, the idea to use the carbon capture and storage capacity of nature's processes as a climate solution is a pretty new idea. The emphasis has typically been on finding green technological solutions that can wean us off fossil fuels and associated carbon emissions, and technologically capture those emissions at source. However, we have come to the realisation that even if we stopped emitting completely (called net zero emissions), we still need to remove all the CO_2 in the atmosphere that has built up since the beginning of the Industrial Revolution. If we don't remove that, we will still see a rise of 1.5°C-2°C. So, there is still a need to remove and store a massive amount of CO_2 on the planet. The best place for that is in soils and sediments of the land and ocean. However, we need plants (habitats) to capture that CO_2 before it can enter storage. It will be necessary to steward habitats and landscapes and seascapes in order to drive the carbon into ecosystems. Animating the carbon cycle recognises that animals can be important players in ecosystems, controlling the ability of plants to capture carbon and soils and sediments of ecosystems to store it. The message of 'Animating the Carbon Cycle' (ACC) is that animal species (especially large mammals) need to be factored into the accounting of how much carbon will be stored in ecosystems. Large animals are also among the most vulnerable to extinction. So, by protecting and restoring animal species and their habitats, we have a win-win for addressing the climate and biodiversity crisis together.

What is your take on using technology for carbon capture and storage? The climate problem will require multiple solutions, so I am in favour of developing all kinds of solutions. These could be nature-based or technology-based. The advantage of nature-based solutions is that they involve a proven 'technology'. Many technology-based solutions require extensive testing before we can be confident of their utility.

How do wild species impact the carbon cycle in terrestrial, freshwater and marine ecosystems? Animals have an impact through a variety of ways, such as foraging, redistributing seeds and nutrients over landscapes and seascapes, and trampling and compacting soil sediments to enhance and stabilise carbon storage. Animal grazing and trampling can also reduce the chances of massive, CO_2-releasing, wildfires, protect against permafrost thawing and the consequent release of methane. Additionally, compacted soils enhance soil and sediment

ABOVE *A* bharal *male in Ladakh. In high-altitude grasslands, herbivores such as* bharal, *ibex, and yak protect carbon stores in soil through trampling and grazing. The message of 'Animating the Carbon Cycle' is that animals need to be factored into the accounting of how much carbon will be stored in ecosystems.*

There is still a need to remove and store a massive amount of CO_2 on the planet. The best place for that is in soils and sediments of the lands and ocean. However, we need plants (habitats) to capture that CO_2 before it can enter storage.

BELOW Prof. *Oswald with his wife Leslea on a mountain in the largest national park of the Canadian Rockies, Jasper National Park.*

COURTESY OSWALD J. SCHMITZ

carbon retention through changes in chemical reactions and microbial processes.

Could you elaborate by way of a few examples? In Indian montane grasslands, wildlife such as *bharal*, ibex, and yak protect carbon stores in soil through trampling and grazing. This reduces soil microbial biomass and hence soil respiration of CO_2 by microbes. As a consequence, the long-term stability of soil carbon storage is *increased* in their presence rather than their absence.

In boreal forests of the northern hemisphere, trees are important for carbon uptake. But browsers such as moose reduce the amount of tree biomass, which means there will be less carbon captured and stored in living trees. Further, there will be less organic carbon in dead leaves and branches falling to the soil to be stored there. Also, in boreal forests the soil can be quite cool because it is shaded by trees. This means that soil microbes don't function well, preventing decomposition of leaves and branches, and thus promoting long-term carbon storage in the soil. But large herbivores such as moose thin forests, thus allowing more sunlight to reach the soil surface, warm it and even dry it out. This promotes microbial decomposition and the release of CO_2 from the soil. Drying the soil also increases the chance of forest fires. So, when wolves prey on moose and reduce their population, they end up assisting carbon capture and storage.

In tropical forest ecosystems, elephants consume and trample shrubs and small trees that constitute the forest understory, reducing competition with canopy trees that store much more carbon. Forest elephants also eat the fruits of canopy trees and disperse their seeds throughout the forest in their dung.

In the Southern Ocean, large whales including sperm, blue, humpback, and southern right whales feed at ocean depths and return to the surface of the ocean to breathe. Here they release iron- and nutrient-rich faecal plumes in surface waters (a process known as the 'whale pump'). This fertilisation effect by whales stimulates surface ocean net primary productivity by phytoplankton. Eventually, some fraction of dead phytoplankton would evade microbial decomposition in the water column and sink. This adds to long-term storage in deep ocean sediments. When whales die, their carcasses sink and add to deep ocean sediment carbon storage pools.

So we are undervaluing the role that animals play in controlling the carbon cycle. Do you suggest that if wildlife populations were to be restored to pre-historic levels, our annual carbon emissions could be captured? The jury is still out on our ability to capture our annual global emissions by restoring wildlife populations alone. It would require significant investment in wildlife, landscape and seascape conservation and restoration. Our best bet must involve reducing carbon emissions by humans and this would necessitate both behavioural and technological changes. But remember, we do not make the argument that ACC is for emissions capture alone – it is primarily to reduce the CO_2 build-up in the atmosphere from the day that the Industrial Revolution began. This is really the other side of the climate stabilisation coin.

It has been suggested that it is vital to rebuild overexploited or depleted fisheries and implement large no-take fishing zones in order to mitigate climate change impacts on fisheries. What do you think of the 30x30 CBD target and the aims of the UN Decade of Ecosystem Restoration? Many fish stocks are not in fact being conserved. They are being exploited in the surface waters of the ocean. But the vast majority of the carbon effect is due to mesopelagic fish – fish that live in the twilight zone below the surface waters of the ocean. They are not yet exploited but are being seriously considered as a new source of fish. Ocean conservation needs to be strengthened to protect the vital role played by marine species.

In the terrestrial realm, rewilding involves the creation of large intact landscapes of connected habitats. This is to ensure that animals can roam widely and maintain their seasonal and annual movement patterns and thereby fulfil their functional roles in ecosystems. So, the idea of a 30 x 30 CBD target is a good one as long as the 30 per cent of land is conserved as connected, not merely isolated patches.

So basically rewilding seems to be the two-in-one solution for our biodiversity and climate crises? But, is this a cost-efficient, viable, people-friendly solution? It can be a cost-efficient strategy because the expensive technological solutions are not yet abundantly proven to work at scale. But we know that nature works – it is what has sustained life on the planet for

millennia. We just need to recognise the economic value of that functional role and include that in our accounting of the costs of human transformation of nature through development and resource exploitation.

Rewilding does not mean preserving landscapes by excluding communities. People who live on the land need to be part of the story – they need to participate in decisions about how conservation will take place. This involves seeking ways for wild animals and humans to coexist across landscapes and seascapes, thereby sustaining opportunities for humans to continue to make a living in their traditional domiciles. We need to draw upon and build on the time-tested knowledge of local communities in parity with ecological knowledge. This could effect changes in culture, institutions and governance structures that are needed to ensure the persistence of animal populations and their functional roles, as well as the livelihoods and welfare of local communities. It could also involve engaging members of local communities in the stewardship of their landscapes, thus earning a dignified living from the imperatives of accelerated carbon capture.

Some suggest that such concepts may look good on paper but developing nations do not have the resources to rewild. Developing nations may not have the financial resources. But they have the critical landscapes and wildlife species needed to develop conservation for the purposes of ACC. Industrialised nations have fewer such landscapes. Clearly the global community requires equitable, just and effective partnerships between those who can support the initiative financially and those who can support it with ecosystems and wildlife. But it requires a recognition of the value of the knowledge base, customs and mores of traditional local communities who live on the land, steward it, and be an integral part of such partnerships.

Will rewilding and animating the carbon cycle in, say, Europe, take funding away from poor and vulnerable nations that are most immediately impacted by climate change? I think every nation on the planet needs to think about how they can and will contribute toward a flourishing planet by addressing climate change and biodiversity loss. There isn't a single global home-run solution. The power of ACC is that it has to be place-based. So, locals around the world can think of creative ways to protect their own wildlife and landscapes as part of a global portfolio of solutions. This can change the mindset of people – the climate and biodiversity problem is no longer something that occurs and needs to be fixed in some 'other' remote place halfway around the world. It is something we can do in our metaphorical backyards. If everyone does their part, financially poor and vulnerable nations will be helped because the richer nations would take care of the planet in their own geographies.

What three key actions would you wish world leaders to take to staunch the climate and biodiversity meltdowns we are currently witnessing?

1. Stop seeing humans as separate from nature. Humans are part of nature. Nature is our home and we need to stop despoiling it.
2. Stop valuing nature merely as a trove of natural resources to fuel our techno-economic economy. We need to value nature for the technologically-irreplaceable life support functions it provides to human and non-human living beings alike. Our long-term survival and prosperity are dependent on that.
3. Stop looking upon wild animals merely as charismatic, iconic showpieces to revere. Recognise their integral, functional roles in ecosystems.

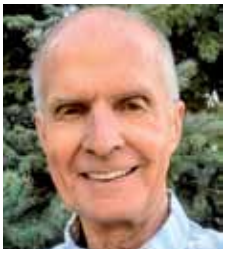
And if you had a magic wand – the top three things you would want them to implement...

1. Account for the full value of nature (natural resources, ecosystem services and natural standing capital), and fully account for the costs of damaging nature (which is now largely treated as an economic externality) when making decisions about developing landscapes and seascapes.
2. Strive to create and preserve intact large-scale coexistence landscapes that enable humans and non-human species to live to the advantage of both in ways that all can flourish together.
3. Embrace the aphorism of the 1970s environmental movement "Think globally, act locally," which was coined way back in 1915 by the Scottish planner and conservationist, Patrick Geddes as a golden rule each and every time major environmental policies are crafted and implemented at national or subnational scales.

BELOW *A school of Bartlett's anthias* Pseudanthias bartlettorum *and whitetip reef sharks at Jarvis Island. The creation of large no-take fishing zones will help restore overexploited fisheries, which will ultimately reduce the negative impacts of climate change on marine wildlife.*

CHEETAH CONSERVATION FUND

THE POWER OF REWILDING IS IN BOTH PRINCIPLE AND PRACTICE



By Vance G. Martin and Tom Butler

WILD11, the 11th World Wilderness Congress, was planned by WILD Foundation, Sanctuary Nature Foundation, and scores of organisations, governments and experts over a period of 18 months and was scheduled to convene in Jaipur, Rajasthan in March, 2020. Owing to the COVID-19 pandemic, the Congress was necessarily cancelled. Numerous products were developed for a global launch at that Congress. One of them was the Global Charter for Rewilding the Earth: Advancing Nature-based Solutions to the Extinction and Climate Crises. Developed by a diverse group of experts from five continents, the Charter is unique in global conservation because it clarifies the principles that undergird the practice of rewilding. In this article, Vance G. Martin and Tom Butler draw heavily and specifically from the text of the Charter, with permission of the WILD11 Executive Committee.

Rewilding – both as an aspirational vision and a practical, visible process, that nature leads with our support – is powerful because it produces individual and collective benefits. In an era characterised by climate breakdown and loss of life's diversity, rewilding offers the possibility for more: More beauty. More abundance. More equity among all creatures that inhabit the Earth – including humans. It offers an invitation to people across the globe, from every background, to be meaningfully engaged in a transformative movement for people and the planet.

When American conservationist Dave Foreman coined the term "rewilding", he used it as shorthand for wilderness recovery on a scale that allows apex carnivores such as wolves, tigers, pumas, and sharks to resume their vital role in healthy ecosystems. Decades later, the word "rewilding" has been embraced by conservationists around the world to include ecological restoration efforts at many scales. Stories in this issue of *Sanctuary Asia* show how landscape-scale efforts, local initiatives, and projects accomplished through global alliances and through neighbourhood volunteers can embody the healing power of rewilding.

However, before we dive into specific practices and places, let's first consider what rewilding means to us as individuals, and why

FACING PAGE *Cheetahs being released into the wild in Namibia. When Dave Foreman coined the term 'rewilding', he referred to wilderness recovery on a scale that allows apex carnivores to resume their vital role in healthy ecosystems.*

it can be as transformative as we propose. By considering the principles that enliven and inform the practice of rewilding, we can orient ourselves to truly transforming the world and ourselves. While specific actions such as establishing Protected Areas and reintroducing missing species are crucial to a rewilding agenda, the bonus outcome from rewilding is a change in consciousness that can fuel the social movement needed to change our planetary course.

First... what is it? Rewilding means helping nature heal. Rewilding means giving space back to wildlife and returning wildlife back to the land and the seas. Rewilding means the mass recovery of ecosystems and the rejuvenation of the life-supporting functions they provide. Rewilding means restoring and protecting specific places – on land and in the ocean – where nature is free to direct the ebb and flow of life. Rewilding is about allowing natural processes to shape whole ecosystems so that they work in all their colourful complexity to give life to the land and the seas. Such wild lands and waters are critical to sustain ecological vitality by supporting intact food webs and natural processes.

Rewilding is also about the way we think. It is about understanding that we are one species among many, bound together in an intricate web of life that ties us to the atmosphere, the weather, the tide, the soils, the freshwater, the oceans, and all living creatures on the planet. The more we learn about and practice rewilding, the more we understand how our species is part of Earth's great community of life.

PRINCIPLES FOR REWILDING

The ecosphere is based on relationships

Rewilding our hearts and minds is fundamental. Thus, a crucial first step towards widespread societal embracing of rewilding is to accept, celebrate, and activate the principle of 'relationship', the essential function and ethic that sustains life on Earth.

Bringing hopeful stories to life

Rewilding is about telling the story of a richer, more vital future but also about executing successful projects – empowering others to support and join this movement by demonstrating positive results.

Embracing natural solutions and thinking creatively

Rewilding can help solve environmental, social, and economic problems. Conservationists should design and implement rewilding projects in ways that are ambitious, strategic, opportunistic, and entrepreneurial.

Protecting the best, rewilding the rest

Conserving the most intact remaining habitats and key biodiversity areas as well as working to recover lost interactions of nature at all levels and restore habitat connectivity in land- and seascapes at every scale, shows the complementarity of rewilding and traditional approaches to nature protection.

Letting nature lead

As in medicine, rewilding efforts should emphasise helping nature's inherent healing powers regain strength, with the goal that management interventions would decline or cease over time. Humility will allow us to cede control, enabling restored natural processes to shape dynamic land- and seascapes of the future.

Working at nature's scale

Natural systems operate at many scales continuously. Similarly, global rewilding efforts can work place by place, incrementally and at various scales to rebuild wildlife diversity and abundance and allow natural processes, such as disturbance and dispersal, to create resilience in natural and social systems.

Taking the long view

To ensure sustained positive effects on biodiversity and quality of ecosystem services (such as carbon storage), rewilding efforts must be planned and implemented with a long-term perspective.

Building local economies

Creating, expanding, and restoring natural areas with abundant wildlife can provide new opportunities to create economic vitality and generate livelihoods linked to nature's vitality.

Understanding ecological history and acting in context

Successful rewilding efforts are informed by deep knowledge of the environmental and cultural history of particular places. Working within the social, biological, and physical realities of a territory will foster successful rewilding outcomes.

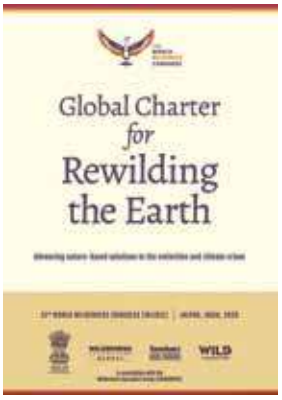
Evidence-based adaptive management

Learning from others, using the best-available evidence, gathering and sharing data, and having the confidence to learn from failure will lead to success and grow the institutional capacity of the rewilding movement.

WORKING TOGETHER FOR THE GOOD OF OURSELVES AND NATURE

Effective advocates for nature build coalitions and forge partnerships based on respect, trust, and common interest. Connecting different disciplines, working intergenerationally and honouring the perspectives of diverse stakeholders will produce successful rewilding results.

Nature also has her own needs. Terry Tempest Williams once wrote, "The eyes of the future are looking back at us and they are praying for us to see beyond our own time. They are kneeling with hands clasped that we might act with restraint, that we might leave room for the life that is destined to come." In this present moment of profound decision for humanity, when our choices will affect every person on Earth, our descendants, and all our relations in the community of life, rewilding offers a wildly hopeful course of action.



Vance G. Martin created and built-out the WILD Foundation for 40 years, working on projects around the world as well as convening (with many partners) the 3rd through 11th World Wilderness Congress. Since recently handing over WILD to a talented leadership team, Vance operates as President Emeritus of Wilderness Foundation Global, an alliance based in the Global South, and is an active board member of numerous initiatives in many countries, including the Sanctuary Nature Foundation. He also continues a very active, long-term role in the World Commission on Protected Areas (IUCN) as Founder/Co-Chair of the Wilderness Specialist Group. **Tom Butler** is the senior fellow of Northeast Wilderness Trust (USA) and a board member of Tompkins Conservation, a U.S.-based non-profit that, for three decades, has led large-scale rewilding projects in Chile and Argentina. He is the author of several books including *Wildlands Philanthropy*, and has served as a lead author/editor on the Global Charter for Rewilding the Earth.

HOW REWILDING WORKS

SOLVIN ZANKL/ WILD WONDERS OF EUROPE

By Magnus Sylvén and Karl Wagner

To restore stability to our planet, we must restore its biodiversity, the very thing that we've removed. It's the only way out of this crisis we've created – we must rewild the world.

– Sir David Attenborough, 'A Life on Our Planet'

Ancient forests that stretch across whole continents. Rivers teeming with fish, so dense that you cannot see the bottom. Herds of several million wildebeest that blanket the horizon. Flocks of birds, so large they block out the sun for hours. These visions of nature seem like something out of a fantasy novel, but they describe sights that would have been readily visible only a few hundred years ago. Since the onset of the Industrial Revolution, the scale of natural destruction

FACING PAGE *Overfishing continues to be a key threat for northern bluefin tuna* Thunnus orientalis *populations*.

by humans has been nearly unfathomable. If this continues unabated, the future of the natural world, as we know it, and with it the future of human civilisation, is at stake.

WHY DO WE NEED NATURE? Almost every day we learn about new challenges: loss of tropical forests and coral reefs, newly-designated endangered species, declining wildlife populations, and, especially, how climate change is wreaking havoc on land and in the sea. Hurricanes, flooding, wildfires, extreme temperatures, and droughts, often with very serious, negative impacts on people and their livelihoods, especially in the less affluent parts of the world, are becoming regular sights in the news.

The loss of ecosystem functionality (often referred to as 'ecological integrity'), is the degradation of the web of life once species are lost or decline in numbers. The level that we are witnessing is staggering and should be setting off all alarm bells. Studies show that only around three per cent of land and sea (97 per cent of the ocean is impacted by 'some kind of fishing') could be seen as still ecologically functional.

Humans tend to forget how much their life, health, well-being and economic prosperity depend on what nature provides. Agriculture is made possible through a stable climate and without native pollinators, harvests would shrink and maybe entirely falter. Functioning ecosystems provide surface and groundwater, and are the best protection from floods and droughts. These are but a few services that functioning ecosystems provide. Despite this, there is a tendency to only understand and value them once they are diminished or have disappeared entirely.

If we treat nature as a partner and let it flourish by giving it enough peace and space from human exploitation, then it becomes our most important ally for the survival and well-being of urban and rural communities, and human civilisation as a whole.

Rewilding is the philosophy of treating nature as a partner and ally. It is about allowing the restoration of intact, functional nature and restoring the natural safety nets human communities depend on in their daily life. It is about giving nature the space it needs; letting nature take care of itself; enabling natural processes to shape land and sea; repairing damaged ecosystems; and restoring degraded landscapes and seascapes. Often, rewilding requires that the comeback of missing key species, such as bison, elephants, tigers, sea otters, and salmon, is promoted and facilitated. These species, often referred to as 'keystone species', play a critical role in how the ecosystems in which they act function and determine the presence of many other species as well. Ecosystems function as a complex web of life, with the actions of one species creating a cascading effect across the food web, that all manner of other species rely on to survive.

TURNING THEORY INTO PRACTICE Although rewilding as a concept is relatively new in theory and practice, proof of the potential positive impacts are already starting to accumulate. There are numerous examples of the success of rebuilding populations of key animal species across Asia, Africa, Australia, Europe, and the Americas. However, it takes longer to evaluate the positive impacts on overall nature and climate. For that reason, we present two examples of conservation action – one in the marine environment (see box on page 44) and the second on land – that are not referred to as 'rewilding' (see box on page 45), but in practice are.

Since rewilding is about "shaping new opportunities for local livelihoods and the wider economy anchored in a more secure future with healthy nature and much higher climate resilience", we also must understand why the voices of local and Indigenous communities must be heard and their needs and concerns addressed.

THE HUMAN FACE OF REWILDING Rewilding goes with the grain of local communities and economies; social participation and

If we treat nature as a partner and let it flourish by giving it enough peace and space from human exploitation, then it becomes our most important ally for the survival and well-being of urban and rural communities, and human civilisation as a whole. Rewilding is the philosophy of treating nature as a partner and ally.

The Power of No-Take Fishing Zones

Ecological extinction caused by overfishing precedes all other pervasive human disturbance to marine ecosystems, including pollution, degradation of water quality, and – until now – anthropogenic climate change. A key tool to rebuild marine life, including fish populations, is to establish no-take – or 'replenishment' – fishing zones. No-take marine reserves are the most effective way of protecting the ocean: the biomass of whole fish assemblages in marine reserves is, on average, 670 per cent larger than in adjacent unprotected areas, and the density and individual size of all taxa (not only fish) are higher: 166 per cent and 28 per cent, respectively. Cascading effects within no-take zones also promote natural processes (for example, natural grazing or recruitment rates) responsible for maintaining resistance or resilience to various natural and human threats and stresses.

In numerous examples, the increase in target predatory species results in decreases of grazing species, which are often their prey. The reduction in grazers, in turn, affects in a positive way the benthic (the bottom-most region of a water body) community structure.

Through spill-over effects and enhanced recruitment of fish and other commercially valuable species, no-take zones have been shown to produce numerous social and economic benefits for local communities, supporting sustainable, local fish yields as well as profits in the surrounding areas. No-take zones can also generate or enhance alternative livelihoods, such as through tourism revenues.

SRIKANTH MANNEPURI/SANCTUARY PHOTOLIBRARY

A key tool to rebuild marine life is to establish no-take – or 'replenishment' – fishing zones.

It has been concluded that "no-take zones may be one of the only tools at our disposal to alleviate the effects of climate change on coral reefs and other marine ecosystems". The comeback of marine fish populations will also have a tremendously positive impact on climate change, facilitating the capture of huge amounts of excess carbon dioxide through trophic rewilding and Animating the Carbon Cycle.

The Global Rewilding Alliance

Anchored in the Global Charter for Rewilding the Earth: Advancing nature-based solutions to the extinction and climate crises, the Global Rewilding Alliance (GRA) was founded by The Wild Foundation and Re:wild in 2020. We base our work on 12 guiding principles outlined in the Charter.

The network of currently 140+ organisations works across Africa, Asia, Australia, Europe, Latin America, North America and globally to rewild more than 160 million hectares of land and sea in over 90 countries. As of today, we have 17 members in India. In addition to the Sanctuary Nature Foundation, the list of organisations includes the Wildlife Conservation Trust, Wildlife Trust of India, Dusty Foot Foundation, River Otter Conservancy, India Climate Collaborative, Tata Trusts, Balipara Foundation, iamgurgaon, and Walk for Water.

Our goal for 2030 is to ensure rewilding becomes mainstream in science, policy and practice, and is recognised globally as being credible, practical, and inspiring: a key approach for people, nature, and climate.

The Global Rewilding Alliance recognises and works actively to strengthen the importance of Indigenous communities as stewards of their traditional homelands, and as key partners to protect, restore, and rewild our Earth.

If you as an organisation are interested in joining the GRA, please contact Alister Scott, alister@globalrewilding.earth.

No-take marine reserves are the most effective way of protecting the ocean: the biomass of whole fish assemblages in marine reserves is, on average, 670 per cent larger than in adjacent unprotected areas, and the density and individual size of all taxa (not only fish) are higher: 166 per cent and 28 per cent, respectively.

entrepreneurship cut across all our work. The human dimension of rewilding has been described in the Global Charter for Rewilding the Earth: Advancing Nature-based Solutions to the Extinction and Climate Crises. The human dimension is further elaborated on in the 12 'principles of rewilding' of the Charter.

Since local communities play a critical role as guardians of global diversity, they are actively involved in many rewilding activities undertaken by the GRA membership on all continents, such as the restoration of the prairies in USA, rewilding and restoration of forests and rivers in northern Sweden, and work with Aboriginal communities across Australia. In the unique Enonkishu Conservancy in Kenya, the *Maasai* community has set aside part of their land for rewilding in parallel to introducing sustainable rangeland management and implementing a tourism model where all guests are a part of the rewilding journey.

Rewilding directly supports human wellbeing through ecosystem services, connecting humans to nature, and creating new, local, and sustainable economies. Rewilding thus directly creates the foundation of many of the UN's 17 Sustainable Development Goals (SDGs), especially #13 (climate change), #14 (life

Restoring Wildebeest Populations in Serengeti, Tanzania

PUBLIC DOMAIN/DANIEL ROSENGREN

The restored wildebeest population on the Serengeti means there are almost no wildfire outbreaks at all, while the rejuvenated grasslands now capture carbon.

Involving the movement of over one million animals, the annual wildebeest migration across East Africa's vast Serengeti grassland is one of the world's most awe-inspiring natural spectacles. It's hard to imagine such a herbivorous horde disappearing from the landscape. But this nearly happened in the first half of the 20th Century, when poaching and disease (the rinderpest virus) saw wildebeest numbers plummet to around 300,000.

The consequences of this collapse were profound. Much of the 25,000 sq. km. Serengeti ecosystem was left ungrazed. The dead and dried grass that accumulated as a result became fuel for massive wildfires, which annually ravaged up to 80 per cent of the area, making Kenya and Tanzania a significant regional source of CO_2 emissions. Over many years, this state also led to the loss of organic carbon from soil carbon stocks, as the entire Serengeti ecosystem became a net carbon source.

The situation changed in the late 1950s when a rinderpest vaccine eventually became available, leading to the effective eradication of the disease. This, combined with anti-poaching measures, saw the wildebeest population gradually recover to natural levels. More animals meant more grazing, which saw carbon shifted from above-ground combustible biomass to the soil via dung, thereby promoting carbon storage and reducing the incidence of wildfire. Every time the wildebeest population increased by 100,000 animals, the area being burned reduced by around 10 per cent. More trees grew, storing more carbon.

Today, the impact of the restored wildebeest population on the Serengeti landscape means there are almost no wildfire outbreaks at all, while the rejuvenated grasslands now capture carbon up to the equivalent of the annual anthropogenic CO_2 emissions of Kenya and Tanzania combined. The Serengeti has become a carbon sink once again.

The case of the wildebeest in the Serengeti is just one example of how animals, and their presence or absence in a particular ecosystem, can impact the capacity of that ecosystem to store carbon. It also shows how the loss of just a single species can have far-reaching implications for ecosystems and climate. By being an integral part of a larger food chain – as wildebeest are – the presence or absence of such species may trigger knock-on effects that grow through the chain to drive significant amounts of carbon into long-term storage on land or in the ocean, or release it into the atmosphere.

Source: Animating the Carbon Cycle: Supercharging Ecosystem Carbon Sinks to Meet the 1.5°C Climate Target, by Daniel Allen, GRA Publication Series 2022/01.

below water) and #15 (life on land), but also #3 (good health) and #6 (clean water and sanitation). Income from ecological services has the potential to reduce poverty (#1), inequality (#10) and raise living standards of local communities (#8). Peace Parks Foundation's holistic, community driven 'Herding 4 Health' initiative and a family-planning project are promising efforts addressing the three last SDGs plus SDG #3 and #6 in the context of rewilding. Peace Park's 'Rewilding Southern Africa' also addresses the root causes of the COVID-19 pandemic by reducing social inequalities and ecosystem degradation, and transforming the way we relate to the environment in which we live – as expressed by the WHO COVID-19 Manifesto. A Disease Surveillance Project of the Wildlife Conservation Trust in India is also set up to avert future epidemics.

REWILDING IN ACTION

Rewilding is the most powerful action we can take to protect human society and communities around the world. By helping nature to heal itself it can:

- Tackle the climate emergency. We must stay below a 1.5°C rise in average global temperature. Rewilding provides the most powerful, long-term, nature-based climate solution that removes surplus carbon generated by humans from the atmosphere. It rebuilds natural resilience against floods, droughts, wildfires, and other threats.
- Repair broken ecological systems and, by doing so, promote survival of species and reduce the threat of the sixth mass extinction.
- Reduce the risks of zoonotic pandemics.

While rewilding may appear to be the luxury of developed countries who can afford it, in reality it is about undoing the mistakes of our past. Rewilding is about rebuilding our connections – rural and urban – with nature and understanding that when our natural ecosystems are healthy, our soil, water, climate, economies and we are healthier too.

The different overviews on the following pages from Australia, Europe, South America, Sri Lanka and Africa and preceding pages from India provide some detailed examples of 'rewilding' in action.

Animal ecologist (Ph.D.) by training, **Magnus** was formerly Head of the Conservation Unit at WWF Sweden and Head of the Europe/Middle East Programme at WWF International. As Co-Director of GRA, he is engaged in the integration of nature, climate and sustainable food production. **Karl** is a scientist by training and an environmental campaigner. Formerly, he worked for many years both at WWF International on global and EU campaigns and for the Club of Rome. For the last 10 years he has contributed frequently to the global campaigns conducted at the WILD Foundation and is Co-Director, GRA.

REWILDING EUROPE

TAKING NATURE RECOVERY TO THE NEXT LEVEL

NEIL ALDRIDGE/REWILDING EUROPE

Support for European rewilding has never been greater than it is today. Those engaged in practical rewilding are finding ways to overcome a range of challenges as they work to scale up nature recovery for the benefit of all.

By Daniel Allen

Today, European rewilding is gathering momentum as a vibrant movement of conservationists and citizens seeking a counterweight to our increasingly regulated lives, landscapes and nature. It signifies a desire to rediscover the values of freedom, spontaneity, resilience and wonder embodied in Europe's natural heritage, and to revitalise nature as a way of addressing many of society's most pressing challenges.

Founded in 2011, Rewilding Europe has established itself as an international initiative, operating at the frontline of European

REWILDING EUROPE

ABOVE *By inspiring, supporting and collaborating with a broad coalition of partners, Rewilding Europe aims to create a Europe that is far richer in nature and more resilient to climate change.*

FACING PAGE *Scotland's Caledonian Forest, which is now being restored, is home to iconic species such as the Osprey* Pandion haliaetus.

rewilding. From the Ukrainian Danube Delta in the east to the Greater Côa Valley in Portugal in the west, we are currently rewilding 10 large landscapes across Europe, with the aim of expanding to 15 by 2030.

Our goal is to see rewilding practised at a large scale across the continent, with the application of rewilding principles, models and tools delivering measurable, demonstrable and sustained benefits for nature and people. By inspiring, supporting and collaborating with a broad coalition of partners – from other rewilding initiatives and NGOs to philanthropic organisations and big business – we want to create a Europe that is far richer in nature and more resilient to climate change, and where healthy wildlife populations help support thriving nature-based economies.

Rewilding Europe has already made considerable progress towards achieving this goal. Nevertheless, there is still a huge way to go before European rewilding realises its game-changing potential. Today, those engaged in rewilding across Europe face a wide range of challenges – from the conceptual to the political and practical.

PARADIGM SHIFT Perhaps the greatest overarching challenge facing those involved in European rewilding relates to a concept known as 'shifting baseline syndrome'. With environmental degradation taking place at local, regional, and global scales over decades and centuries, people's accepted thresholds for the state of nature around them are continually being lowered. A lack of awareness about how European landscapes and their wildlife populations looked in the past means that their condition

From the Ukrainian Danube Delta in the east to the Greater Côa Valley in Portugal in the west, we are currently rewilding 10 large landscapes across Europe, with the aim of expanding this to 15 by 2030.

BRUNO D'AMICIS / REWILDING APENNINES

ABOVE *By supporting the development of nature-based tourism, rewilding can benefit rural European communities facing socio-economic challenges.*

today is simply accepted by most Europeans as how things should be.

In Scotland, for example, where our Affric Highlands rewilding landscape is situated, most people think that hillsides denuded of trees are completely natural. In fact, the ancient Caledonian Forest – a temperate and wildlife-rich forest comprised of species such as Scots pine, juniper, rowan and aspen – once covered much of the country. As a result of widespread clearance, the planting of non-native tree species, and grazing pressure from unnaturally high deer populations, it now covers less than 200 sq. km. This decline has had a hugely negative impact on Scottish wild nature, and is only now starting to be reversed.

One of Rewilding Europe's key roles is to demonstrate practical rewilding and its benefits in our operational landscapes. Through our efforts on the ground, backed by effective communications, we are working to change the established European mindset that the intensive management of nature is both normal and desirable. As a result, more and more people are coming to understand that restoring natural processes, and giving nature the space and freedom to manage itself, is the best way to preserve and revitalise Europe's rich biodiversity. And, much more than this, the best way to ensure that nature can keep delivering the wide range of benefits on which Europeans depend – from clean air and fertile soil, to the locking up of atmospheric carbon and enhanced health and wellbeing.

Across many of our operational landscapes, we are working to show how nature recovery, enabled by rewilding, can generate new business opportunities, jobs and income – particularly in rural areas.

PRIORITISING PEOPLE It is important to emphasise that rewilding is as much about people and communities as it is about nature. Many parts of Europe are characterised by rural depopulation, as people who once lived in the countryside move to the city. Today, 40 per cent of Europeans live in cities and

32 per cent in suburbs and towns, while only 28 per cent live in rural areas. If trends continue, half of the total EU population will live in a city by 2050. This dynamic is also evident in India, where the pace of urbanisation is rapidly accelerating.

The negative impacts of rural depopulation are both numerous and pervasive. Local economies decline and jobs become scarcer. Schools, shops and hospitals are forced to close. Cultural heritage is eroded. As land is abandoned and livestock disappears from the landscape, a lack of grazing leads to encroachment by shrubs and other combustible vegetation. This not only lowers biodiversity, but heightens the risk of catastrophic wildfire outbreaks, which are becoming increasingly common in Europe's Mediterranean regions as our climate heats up. Rewilding Europe is working to reintroduce free-roaming herbivores such as wild horses and European bison in many of its rewilding landscapes because their low-intensity grazing helps to clear such vegetation as well as to enhance biodiversity.

Rewilding is not a panacea, but it can help to address all of these issues. Across many of our operational landscapes, we are working to show how nature recovery, enabled by rewilding, can generate new business opportunities, jobs and income – particularly in rural areas. By integrating rewilding objectives into business plans, we are supporting a growing number of enterprises and communities in the development of nature-based economies.

Our work in Portugal's Greater Côa Valley, which is characterised by rural depopulation, exemplifies this. Here, the Rewilding Portugal team has established the Wild Côa Network – an association of more than 40 like-minded local enterprises (from guesthouses to handmade natural product sellers), who share a vision for a wilder and more sustainable future. The team is also reintroducing wild and semi-wild herbivores, such as horses and Tauros, into the landscape (the Tauros is a bovine specifically bred to perform a similar ecological role as the long extinct aurochs – the wild ancestor of all domesticated cattle). In addition to boosting local nature-based tourism, these iconic grazers are helping to reduce the risk of catastrophic wildfire by consuming combustible vegetation, which has built up as livestock numbers have declined.

A COUNTERPRODUCTIVE POLICY SPACE Europe's policy environment poses another challenge for those involved in rewilding. The recent passing of the so-called 'Nature Restoration Law', which establishes legally-binding nature restoration targets for EU Member States, offers significant hope for the future. On the flip side, however, the European Union's hugely influential Common Agricultural Policy (CAP) continues to promote intensive and less sustainable farming practices. In doing so, it largely ignores the benefits that natural grazing with wild and semi-wild herbivores – a key natural process that Rewilding Europe is working hard to scale up – could provide. Such benefits include improved biodiversity, enhanced carbon sequestration, and better protection against catastrophic wildfire outbreaks.

The negative impact of the CAP is particularly evident in our Rhodope Mountains rewilding landscape in Bulgaria, where it is leading to the intensification of grazing and hampering rewilding efforts. Together with other NGOs, Rewilding Europe will continue to call for better political support for natural grazing in European landscapes. The Rewilding Europe-coordinated GrazeLIFE initiative (2018-2021), which considered the Rhodope Mountains as one of its study areas, has already outlined how European policies – particularly the CAP – could better support extensive grazing.

JOINED-UP THINKING While trends such as rural depopulation continue to see many Europeans relocate, Europe is still a densely-populated continent overall. Infrastructure development and agricultural intensification are the main drivers of declining European biodiversity owing to multiple stressors, particularly fragmentation of habitats.

Connectivity is an essential element of healthy, properly functioning ecosystems. Animals and plants need to be able to move easily and securely between natural areas to survive, thrive, and adapt to shifting climate zones. Rewilding Europe is working hard to create safe corridors in many of its rewilding landscapes, enhancing connectivity to further support the wildlife comeback that is already happening in Europe, and enabling mobile species to adapt to climate change.

An example of this approach can be found in our Central Apennines rewilding landscape in Italy. Here, the development of 'coexistence corridors' by the local rewilding team and partners is enabling endangered Marsican brown bears and other wildlife species to move safely through populated areas, while simultaneously enabling local communities to benefit economically from the resurgent wild nature around them.

Today, some of the challenges facing European rewilders are unique to the continent, while many are faced by rewilders in other parts of the world. As the European rewilding movement continues to develop, those engaged in rewilding – including Rewilding Europe – are learning how to overcome these challenges in order to scale up nature recovery and its associated benefits as quickly as possible.

Daniel Allen is an award-winning writer and photographer based in the U.K., with a focus on rewilding and conservation. He works for Rewilding Europe as the initiative's lead writer and editor.

THE WILD PUBLIC-PRIVATE PARTNERSHIP

DIETMAR DENGER IN COLLABORATION WITH SERVICIO NACIONAL DE TURISMO (SERNATUR)

By Carolina Morgado

Nestled at the southern tip of South America, Chilean Patagonia stands as a symbol of untamed wilderness, and much more. Here, nature reigns supreme. Towering peaks adorned with ancient glaciers stand in stoic majesty, and windswept plains invite the imagination to roam as free as the guanacos that gracefully traverse through the Patagonian steppe. Meanwhile, soaring high in the far reaches of the sky, the Andean Condor observes omnipresent in search of carrion, offering a living testament to the importance of complete trophic webs.

An intricate tapestry of ecosystems and species thrive in this landscape-level sanctuary for biodiversity. Within the realm of its temperate rainforests, lush emerald canopies shelter elusive creatures such as the endangered Darwin's frog, the only amphibian known to exhibit male egg swallowing, nurturing its offspring within his vocal sac. Along 2,800 km. of coast, an intricate web of fjords has carved its way through, forming stunning seascapes where the cold waters mirror the fading traces of the last ice age. Beneath the surface, giant kelp forests stand as guardians of the underwater world, nurturing and protecting a remarkable array of species, while sequestering large amounts of CO_2 and contributing to climate change mitigation.

LARGE-SCALE REWILDING These landscapes and seascapes enchanted Douglas and Kristine Tompkins, North American philanthropists, who felt an irresistible pull that transcended the confines of their former corporate lives. Conscious of the accelerating forces of the global eco-social crisis, and drawn by a vision to preserve wilderness, they settled in Chilean Patagonia in the early 1990s and devoted their full energies to acquiring tracts of land towards a mission of landscape-level conservation. By forming fearless local teams in the field and working closely with multiple Chilean Government administrations, they set their sights on a strategy of leveraging Protected Areas, where the lands they managed to acquire were donated to the country, with a commitment that the Chilean state will convert or reclassify surrounding public areas for the creation of vast national parks.

After almost three decades of relentless work through their foundation, Tompkins Conservation, several decrees were signed with the Chilean Government to manage a land donation of

FACING PAGE *The Andean Condor is living testament to the importance of complete trophic webs in Chilean Patagonia. Biodiversity has benefited immensely from the conservation and restoration efforts of the Tomkins Conservation and Rewilding Chile.*

JAN VINCENT KLEINE

JAN VINCENT KLEINE

TOP LEFT *A male huemul, one of the most endangered deer species in the Americas, being monitored by the Rewilding Chile team. Today, conservation efforts for the species, of which only 1,500 individuals remain across its entire distribution range, are focused on the Huemul National Corridor initiative, working in conjunction with the Chilean government to safeguard the species as a whole.*

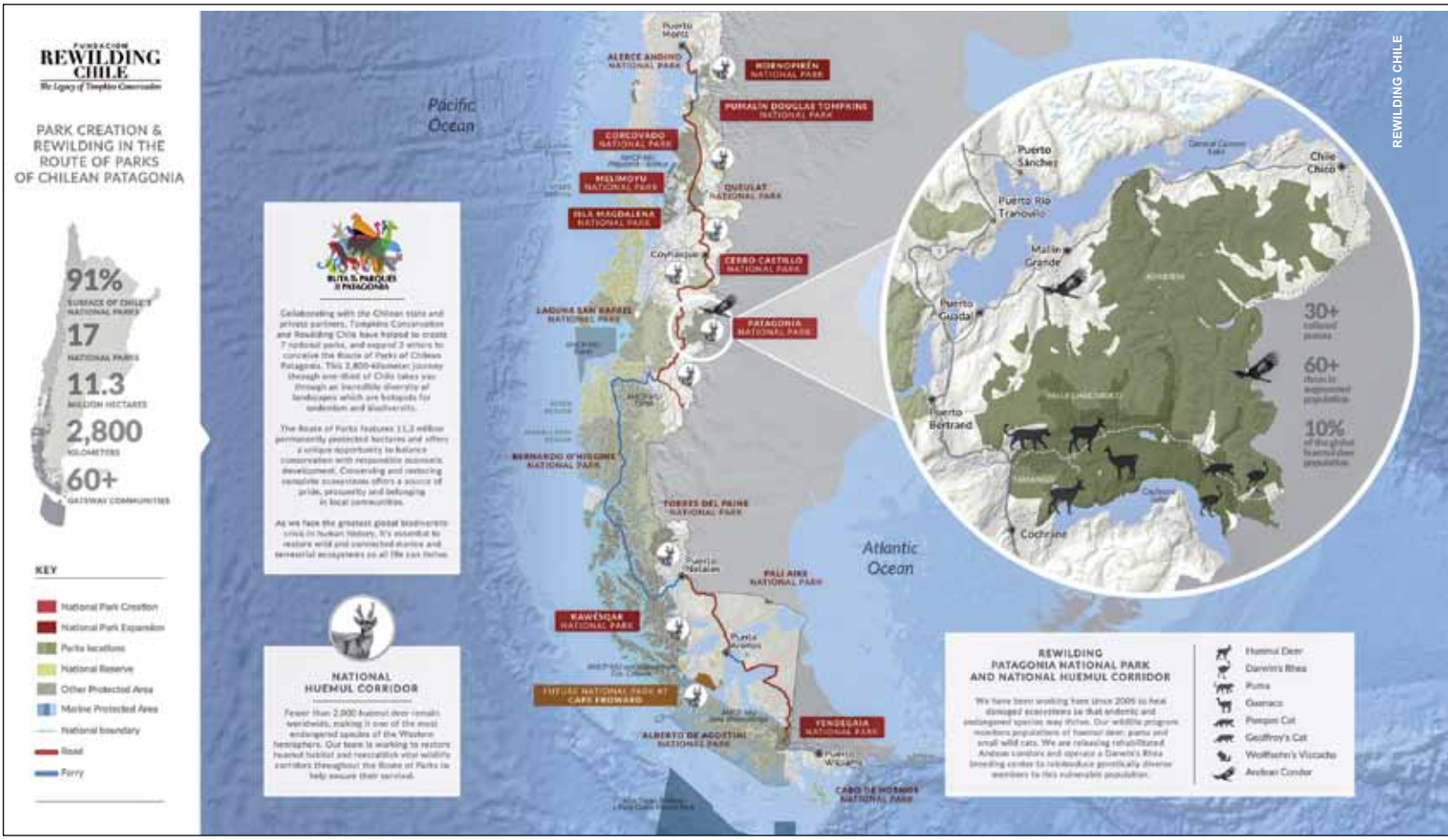
BOTTOM LEFT *Don Arcilio, once a* 'leonero' *or puma hunter, now works with the wildlife team of Rewilding Chile in the tracking and monitoring programme for the species.*

507,000 hectares, one of the largest private land donations to a government in history. Along with the inclusion of 985,000 hectares of state-owned land and the reclassification of 2.6 million hectares of reserves into national parks, these efforts added over four million hectares to the country's system of Protected Areas. However, the creation of national parks is just the beginning; it must be accompanied by complementary actions that amplify the impact and scope of conservation. This vision gave birth to Rewilding Chile, carrying on the legacy of Tompkins Conservation to achieve large-scale rewilding initiatives focused on protecting and restoring ecosystems in Chilean Patagonia to their full potential.

An exemplary testament to this commitment is Patagonia National Park in Chile, where the foundation has taken on the challenge of transforming an extensive livestock ranch into a functional Protected Area. With the dedicated efforts of local conservation managers and rangers, significant progress has been secured in the revival of one of the most endangered deer species in the Americas, the South Andean or huemul deer *Hippocamelus bisulcus*. Presently, Rewilding Chile is leading a new collaborative strategy with the Chilean government, the National Huemul Corridor, aiming to enhance the viability and connectivity of deer sub-populations across the entire species distribution range.

Furthermore, the team has achieved a significant milestone by restoring and safeguarding the habitat of the Darwin's Rhea *Rhea pennata*, an ostrich-like bird critically threatened at the regional level, with less than 20 individuals remaining in the area when the organisation had first initiated its efforts. Through the establishment of a specialised

With the dedicated efforts of local conservation managers and rangers, the foundation has made significant progress in the revival of one of the most endangered deer species in the Americas, the South Andean or huemul deer.



centre for the reproduction of this species, the rheas have been successfully rewilded in an area where they were once historically abundant but had been displaced on account of past overgrazing practices. At present, the numbers of the species have tripled.

COMMUNITY PARTNERSHIPS

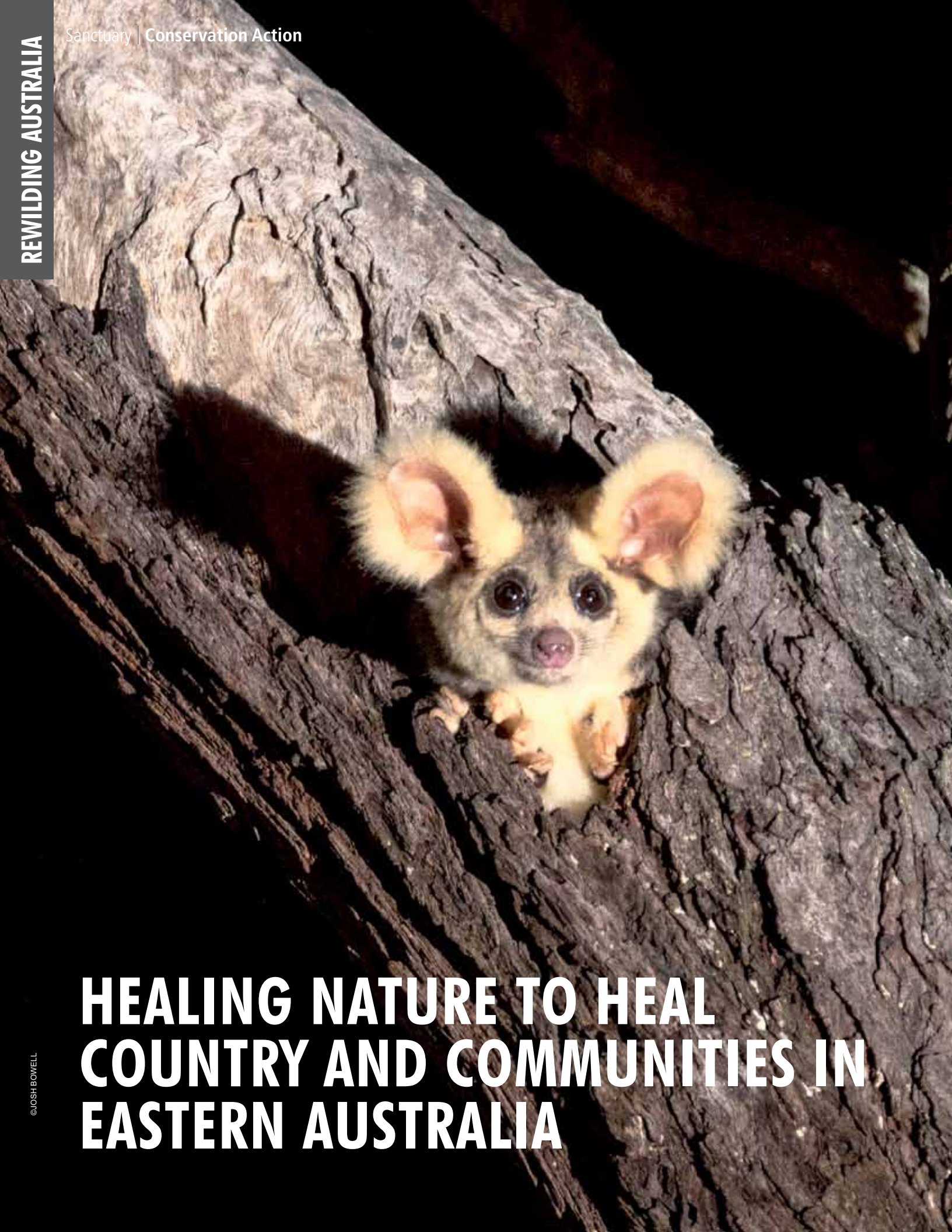
The overgrazing issue has been tackled comprehensively, drawing from a transdisciplinary approach to offer valuable insights for the foundation's strategies. Patagonia's cultural heritage of cattle and sheep ranching has deeply influenced the landscape and way of life for its rural inhabitants. Thus, an in-depth understanding of the region's historic dynamics has been pivotal in effectively addressing the persistent human-wildlife conflicts, particularly concerning the interactions between the puma and sheep ranchers. A notable aspect of our wildlife recovery programme is that some of our most knowledgeable staff members were once livestock workers who used to track and hunt pumas. Their firsthand experience has brought a unique perspective to the team, fostering greater empathy and driving effective conservation efforts that promote harmonious coexistence between humans and wildlife.

Recognising the crucial role of engaging and empowering local communities in successful conservation, the foundation has made a steadfast commitment to forging a strong connection between society and its national parks. To achieve this, the foundation has implemented a series of place-based 'Friends of Parks' programmes, designed to cultivate a sense of ownership and stewardship among the communities residing around the Protected Areas. Currently, three national parks have benefited from this programme, while we are actively working to expand it to two more parks within the next year. Through these initiatives, we aim to foster a deep-rooted bond between people and their natural heritage, ensuring that conservation becomes a collective endeavour that thrives on local involvement.

At present, Rewilding Chile's work moves not only towards countering the crises of extinction and climate change, but we also acknowledge that the future of conservation hinges on influencing the economic development of the region. Thus, we are advocating for the Chilean Patagonia Route of Parks, a visionary approach that views tourism and related activities as powerful catalysts for local economic growth, placing a strong emphasis on attracting investments that contribute to the preservation of our beloved national parks. By nurturing this symbiotic relationship between nature and sustainable tourism, our goal is to create a future of well-being, benefiting both the majestic wilderness of Patagonia and the communities that call this breathtaking region home.

ABOVE *Park creation and rewilding in the Route of Parks of Patagonia.*

Carolina Morgado is the Executive Director of Rewilding Chile, formerly Tompkins Conservation Chile. She has played a pivotal role in orchestrating the substantial land donation to the Chilean government,and is working toward the establishment of several terrestrial and marine protected areas.



HEALING NATURE TO HEAL COUNTRY AND COMMUNITIES IN EASTERN AUSTRALIA

By Tandi Spencer-Smith

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Within the verdant valleys and gum-dotted peaks of eastern Australia's Great Eastern Ranges live a rich diversity of plants and animals found nowhere else on Earth. These are unique and cryptic species such as the koala, platypus, cassowary, and Jurassic-era wollemi pine. A rich tapestry of Indigenous songlines (maps of the land) and cultural history are woven through the ancient region, one which First Australians have been living in and caring for over tens of thousands of years. Today, the flourishing area supports the livelihoods of 80 per cent of Australia's human population, while its striking natural scenery draws millions of tourists every year.

But this is also a region under immense pressure. In the driest continent on Earth, the mountainous spine of the Great Eastern Ranges traps moist air coming in from the Tasman Sea and converts it into much-needed rainfall, creating a reliable supply of fresh water. This, along with the region's rich soils and hospitable climate, are drawing an increasing number of people, resulting in rapid development and large-scale clearing of habitat to make way for agricultural lands, mining, cities and infrastructure.

To reverse the pervasive impacts of habitat loss, fragmentation and degradation, the Great Eastern Ranges (GER) (see box on page 55) initiative was established in 2007. It brings people together around a shared vision of well-connected, resilient and thriving communities, landscapes and natural systems across eastern Australia. GER serves as a backbone organisation, engaging landholders, local communities and traditional owners through its regional partnerships in projects that heal nature and provide holistic natural solutions to our climate, biodiversity and wellbeing challenges. This community-centred approach ensures that activities meet local needs and priorities, while combining across multiple landscapes to create positive impacts for people and nature at the regional and continental scale.

A NEW CHALLENGE Already, the impacts of climate change are exacerbating existing threats and resulting in unprecedented new challenges for Australia. No event brought this into starker reality than the Black Summer bushfires of 2019 to 2020. Fuelled by a prolonged drought and wide-spread heatwaves, the bushfires seared through 190,000 sq. km. of eastern Australia,

ABOVE *Australia's Great Eastern Ranges (GER) hosts a rich biodiversity found nowhere else on Earth including unique and cryptic species.*

BELOW *Local school children in the Kanangra-Boyd to Wyangala Link section of the GER help to plant new habitat.*

FACING PAGE *A greater glider* Petauroides volans*, one of the world's largest gliding mammals, emerging from its nesting hollow in the GER.*

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ABOVE LEFT *The spotted-tailed quoll is a resident of the Great Eastern Ranges. Its population is seriously threatened on account of hunting by feral animals such as dogs and cats, as well as habitat destruction.*

ABOVE RIGHT *A kangaroo surrounded by a forest burnt out by the Black Summer bushfires in New South Wales South Coast. Fuelled by a prolonged drought and wide-spread heatwaves, the fires seared through 190,000 sq. km. of eastern Australia, killing and injuring a staggering three billion animals.*

impacting nearly 80 per cent of the population and killing and injuring a staggering three billion animals. In the aftermath of the devastation, GER pioneered a bushfire recovery programme to help nature and communities heal by repairing the land and natural systems upon which they depend.

To identify the places most in need and pool resources, GER worked with researchers from Griffith University and the Australian National University in early 2020 to map the post-fire footprint. This resulted in the identification of several landscapes which would form the focus for on-ground efforts. With the support of other environmental organisations and Australian federal and state governments, GER has been working with partners over the past three years to roll out complementary bushfire recovery projects in these landscapes.

Australia's Great Eastern Ranges

- The Great Eastern Ranges extend from southern Victoria to the north of Cairns parallel to the eastern coast of Australia.
- The region encompasses two very old, mountainous landscapes – the Great Dividing Range and the Great Escarpment.
- The Great Dividing Range is the main watershed of eastern Australia. The 3,700 km.-long range is a cordillera – it comprises low mountain ranges, uplands and plateaus. The Blue Mountains National Park, a nature reserve, lies in this region. The mountains apparently take their name from the bluish colour caused by the diffusion of light through oil droplets, which are released by indigenous eucalyptus trees.
- The Great Escarpment runs along almost the length of the eastern coast of the continent, east of the Great Dividing Range, for about 3,600 km. It is bisected in several places by rivers heading to the sea.

RETURNING LIFE TO THE LAND Since early 2020, GER has been supporting local groups to engage bushfire-affected landholders, communities and traditional owners in projects that heal country and return life to their land. These science-led activities are carefully tailored to meet the unique needs and priorities of each landholder and site. As well as helping nature to recover, the activities are providing people with a way to bounce back, reconnect with country, and build resilience in the face of future climate disasters.

These activities have included the creation of critical new habitats through planting and assisting natural regeneration; installation of nest boxes to replace the lost tree hollows that hundreds of Australian species of birds, mammals, reptiles and frogs depend on; protection of core habitats through private land conservation; the management of major threats, such as the use of traditional burns to control the weeds that quickly sprung up in the aftermath of the fires and smothered new growth; piloting the use of 'virtual' fences to reduce the impact of vehicle strike on remaining wildlife; ecologist and citizen science-led surveys to monitor wildlife populations; building the capacity of landholders to steward their land and creating the next generation of nature carers through educational events and development of teaching material.

Since being launched, the bushfire recovery programme has resulted in the reconnection of tens of thousands of hectares of habitat, the establishment of over 250,000 new trees and shrubs, the installation of hundreds of nest boxes and the engagement of more than 1,000 people in various conservation activities.

As well as benefiting regional economies by restoring natural infrastructure, direct benefits have also been provided through the creation of new job opportunities and the local sourcing of materials for on-ground work.

With climate disasters becoming increasingly frequent and more intense, community-led conservation initiatives such as this that rewild Australia at the scale needed to address our planetary challenges, are needed now more than ever.

Tandi Spencer-Smith is the Head of Communications and Partnerships at Great Eastern Ranges. She has over a decade of experience in conservation working in executive level roles for national and global environmental organisations.

AFRICA'S CROSS-BORDER CONSERVATION

PEACE PARKS FOUNDATION

I know of no political movement, no philosophy, and no ideology which does not agree with the Peace Parks concept as we see it going into fruition today. It is a concept that can be embraced by all. In a world beset by conflict and division, peace is one of the cornerstones of the future. Peace Parks are building blocks in this process, not only in our region, but potentially the entire world.

– Former President of South Africa, Nelson Mandela, 1997

By Freddie Ugo

ABOVE *A beautiful adult white rhino, successfully translocated by the Peace Parks Foundation. Here it will be safer and provide benefits for the surrounding ecosystem, simply by living in it.*

A CONTINENT'S CONUNDRUM Africa, the second largest continent by both population and land mass, is key to the survival of some of the world's most unique and valuable ecosystems, ranging from tropical rainforest and savannah to temperate coniferous forests and mangroves.

The very existence of these ecosystems relies on the animals that live within them. None more than the largest of all, termed megafauna, such as elephants, lions, and rhinoceros. These species work as 'ecosystem engineers', whose very activities shape the world in which they live. Take savannah elephants for example, who often push over trees to feed on leaves and bark, playing a pivotal role in promoting a mix of grassland and forest, which helps foster a wider variety of species and larger carbon sinks. Africa boasts the highest population and diversity of megafauna in the world, but it is under severe threat. While many African nations are recovering from decades of armed conflict and the destruction it caused, continued population growth is leading to enormous stress on natural resources. It is a vicious cycle, where those worst affected by climate change are required to further exploit the land and resources simply to survive. With more than a third of the population of southern Africa being rural, this issue could not be more pertinent. Therefore, it is imperative that wildlife is restored and protected.

PEACE PARKS This is where the Peace Parks Foundation (PPF) comes in. Founded on February 1, 1997, by HRH Prince Bernhard of the Netherlands, President Nelson Mandela, and Dr. Anton Rupert, the goal of PPF was to protect nature in southern Africa by facilitating the establishment of 'peace parks', or Trans-Frontier Conservation Areas (TFCAs). In other words, the aim was to create national parks and conservation areas that surpass national boundaries. Many borders, especially in Africa, owing to its history of colonialism (see box on page 57), have very little to do with the geography of the area. The thought was that, as ecosystems do not 'know' political frontiers, connecting Protected Areas through cross-country corridors should enable the migration of megafauna, with the wonderful side-effect of generating a peaceful dialogue between participating African nations. What we see today, 26 years later, is the brilliant success of this visionary idea.

The vision of the Peace Park Foundation is "to restore a tomorrow for life on Earth", by reconnecting Africa's wild spaces, to "create a future for man in harmony with nature". It does this by securing and channelling funds from international donors to national parks that are part of the various TFCAs, and ensuring that they are spent in the most effective and efficient ways. Through this work, PPF has successfully incorporated over half of the declared conservation estate area in southern Africa. At more than one million square kilometres, it exceeds the combined landmass of France and Spain.

One of the most ambitious projects PPF engages in is the translocation of wildlife from areas of overpopulation to areas of decimation. By translocating groups of animals, it re-establishes extirpated populations – those that would have historically existed

in an area but have since been lost because of poaching or habitat loss. It also helps to promote genetic diversity, whilst relieving pressures of overpopulation at the capture location. Through this initiative, Peace Parks has successfully reintroduced over 17,000 mammals across southern Africa. Recently, PPF successfully facilitated the cross-border translocation of five black and five white rhinoceros from the Manketti Game Reserve, South Africa to the Zinave National Park, Mozambique.

REWILDING FOR ALL This sort of multi-national cooperation is made possible by the promise of mutual benefits, as rewilding includes community development and the creation of sustainable livelihoods. Millions of people living in and near TFCAs rely on these natural spaces to provide food and income. PPF, through their Community Development Programme, works directly with communities to promote economic growth and development based on the sustainable use of natural resources. This includes the provision and implementation of sustainable, community-based agriculture for food security, and many ecotourism-based projects.

To undertake such grand endeavours as these, PPF relies on the generous support of the donor community and dedicated partnerships with organisations that have been translocating wildlife for many years. These are massive logistically and politically challenging tasks, but it just goes to show how much can be achieved with constant support from donors and experts, the right political will and dedication, and a strong vision for the future.

Freddie Ugo is a team member of the Global Rewilding Alliance. Currently undertaking a Masters in Conservation Science at the Imperial College London, he spends his time between raising awareness for rewilding as a solution to global issues, and researching the effectiveness of its implementation globally.

PEACE PARKS FOUNDATION

A map of the essential Trans-Frontier Conservation Areas (TFCAs), crossing the political borders of South Africa, Mozambique, and Zimbabwe.

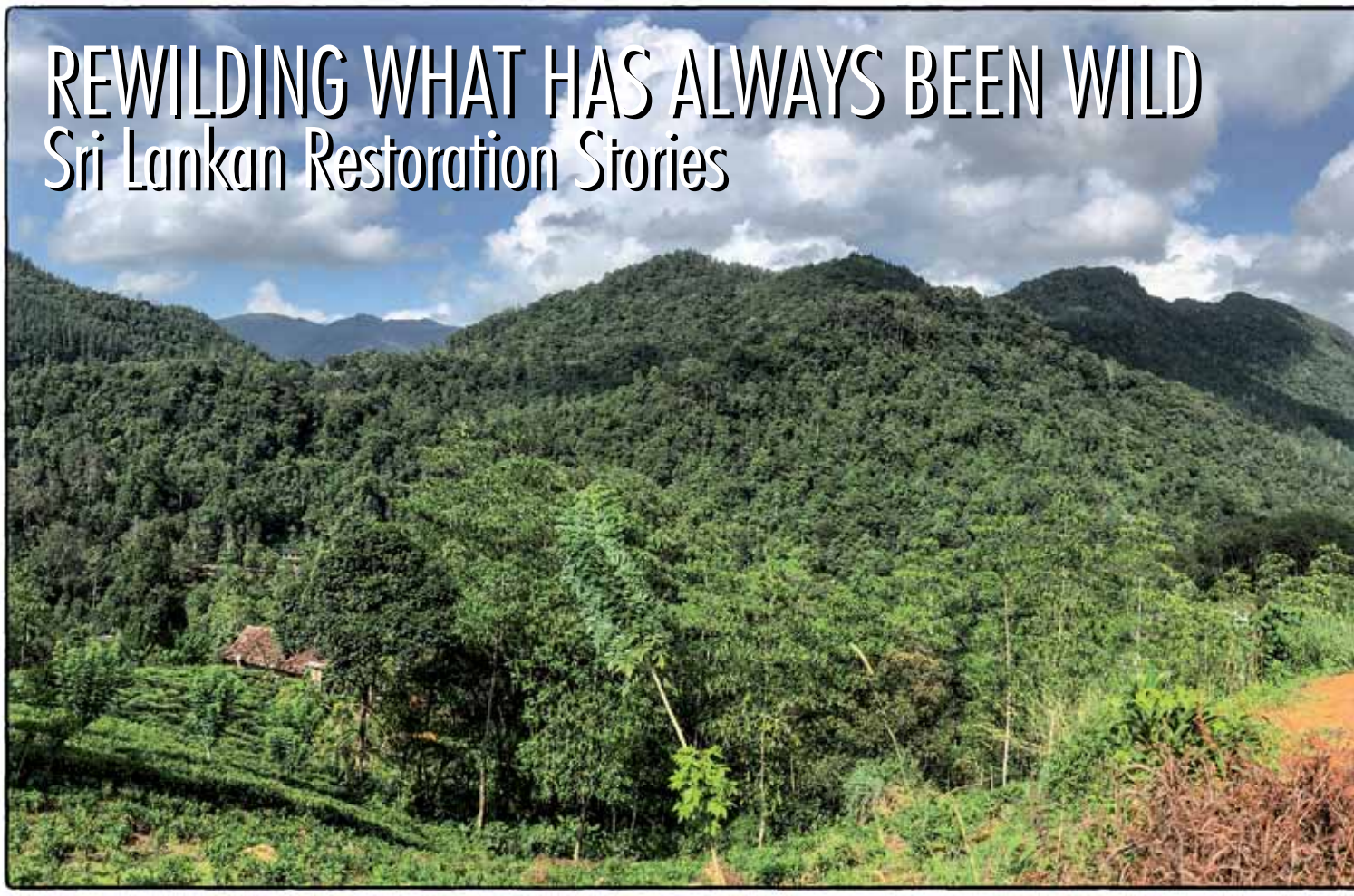
Colonialism in Africa

Modern-day conservation in Africa cannot be discussed without understanding the historical and contemporary impact of Western colonisation of the majority of African nations. European powers created borders and transformed these nations into ready markets, and mineral and agricultural resources, in the process exploiting humans as manpower to do so. Despite having seemingly freed themselves of the shackles of colonialism by the 1960s, the impacts of colonial rule are still felt both by societies and by the natural environment, which was completely transformed and partitioned to suit the wants of the West. Borders, that do not reflect cultural or natural boundaries or transitions, were created; these still exist today, creating barriers for the migration of animals and creating challenges for trans-frontier conservation. Industrialisation and urbanisation caused ecosystems to be destroyed, as there was increased demand for the unsustainable use of ecosystem services that Africa could provide. For instance, aggressive hunting for savannah elephants for their ivory was a direct result of increased demand for such 'treasures' in the 'developed' world. By the end of the 19th Century, the extent of this demand led to around 65,000 pachyderms being killed annually, decimating the natural balance in place in the African savannah. Forests, already in decline were converted to farmlands, leading to permanent desertification of land. Often, the European settlers did not consider the environmental degradation to be a result of their actions, leading them to blame the colonised. The echoes of this continue today, with many NGOs and governments that intervene for conservation reasons, communicating ineffectively with all stakeholders, including those communities that rely on the very land in which they live. The Intergovernmental Panel on Climate Change (IPCC) recognises that "historical and ongoing patterns of inequity such as colonialism" are a cause for "vulnerability of ecosystems and people to climate change".

We should remember that *Homo sapiens* evolved on this very African continent, which is still often portrayed as completely wild with virgin nature, as an 'African Eden'. Even before colonisation, Africa was inhabited and farmed. No one can deny the destructive impact of humans on the environment many thousands of years ago. But, many traditional communities that evolved with the land wove nature protection into their cultures, livelihoods, and lifestyles, leading to a sustainable balance being found between man and nature. Any solution for the conservation and protection of the environment must involve local communities, who understand and rely on the land, along with strong, informed science that can be used in conjunction to make long-lasting, beneficial, and regenerative decisions for future generations.

Decolonisation must be recognised as a survival strategy in this era of an advanced climate crisis.

REWILDING WHAT HAS ALWAYS BEEN WILD
Sri Lankan Restoration Stories



Text, Images and Cartography by Ian Lockwood

I'm climbing up a weathered granite hillock that emerges from a riot of verdant, dry-evergreen jungle growth in a remote corner of Sri Lanka. My family is up ahead and I pause to take in the landscape and watch a Crested Serpent Eagle circling above us. Across pockets of forest and a few abandoned rice fields and salt estuaries, shimmers the Indian Ocean. Under a warm October sun, the sky is a deep blue with high, wispy clouds. A cacophony of dry zone bird songs emanates from the forest. Soon, the North East monsoon will bring its seasonal nourishment to this part of the island, but at the moment the landscape seems parched. Up ahead on the summit of this hillock are the crumbling remains of a 2,000 year-old Buddhist dagoba. Archaeological sites like these often include beautifully-carved figures of wild creatures – elephants, lions, and horses – reminding us of an age-old relationship between humans and wildlife. In fact, we are on the boundary of a large Protected Area – the Yala-Kumana complex – but there are no divisions or clear boundaries between the wilderness and anthropogenic landscapes. This is the situation in much of Sri Lanka, where wild and human landscapes intermingle and are difficult to demarcate. It's a fine place to contemplate ideas of wilderness, rewilding, and restoration in the Sri Lankan context.

In an age of rapid human population growth, consumerism, resource exploitation and human-induced climate change, notions of wild or wilderness are timely. News of environmental degradation of marine and terrestrial ecosystems owing to out-of-control forest fires, Amazonian deforestation and plastic pollution can be overwhelming. The idea of rewilding is a relatively new concept and a timely, important strategy that seeks to address these challenges.

'WILD' AND WILDERNESS IN SRI LANKA The notion of 'wild' as something separate from our normal human landscapes is somewhat alien in Sri Lanka and the wider South Asian context. 'Wild' suggests a landscape or area free of *Homo sapiens* and all the inglorious impacts of our species. In response to human-dominated landscapes, major efforts are underway to rewild landscapes in Europe and other parts of the world. In an important article in Conservation Biology, the authors present a "continuum of wilderness" stretching from urban to wilderness. Rewilding, a step along the continuum, is "the science-based restoration of self-regulating ecosystems and to a transformation in human–nature relationships" (Soulé, 1995, and Carter *et al*., 2021).

Where Sri Lanka sits is not clear and its position on the continuum is complicated because of the degree that Sri Lanka's ancient civilisations have been closely intertwined with natural

systems and cycles. Some of the country's most-visited protected wilderness areas were previously the sites of sophisticated ancient 'hydrologic civilisations'. These early human communities were genius water engineers who learned to preserve torrential monsoon rains in tank systems that sustained them far into the long dry season. The Yala-Kumana complex hosted the Ruhuna civilisation, which was in existence as early as 2,000 BCE. Wilpattu National Park, home to some of the finest dry zone forest ecosystems and one of the first national parks in Sri Lanka, has ruins of some of the earliest human visitors to Sri Lanka. The Peak Wilderness Protected Area in the Central Highlands hosts an annual, crowded human pilgrimage season, and yet is renowned for its biodiversity. New discoveries of amphibians and ongoing studies of the movement of leopards in and out of the Peak Wilderness Protected Area make it one the most exciting places for conservation biologists.

MODERN CRISIS IN THE LAND OF SERENDIPITY Regardless of its rich history of human-wildlife coexistence, there is little doubt that there is a crisis with humans and their wild neighbours in 21st Century Sri Lanka. Agricultural expansion, urban growth and other changes have put pressure on large mammals. There are few weeks that pass without news of an elephant being electrocuted or a poor farmer's homestead being vandalised by pachyderms. Tea workers in the Central Highlands are encountering leopards more frequently. Photographs of elephants rummaging in piles of mixed waste in the Cultural Triangle have shocked audiences in Sri Lanka and around the world. The modern approach, influenced by experiences elsewhere, has been to dig trenches and install electric fences around wilderness areas.

Since Sri Lanka's independence in 1948, there has been a significant loss of forest cover: the Forest Department estimates Sri Lanka's 45 per cent forest cover in the mid-1950s is down to less than 30 per cent cover today, and human impact has spread with a population that is now 22 million strong. Large-scale plantations of non-native timber species, which were encouraged several decades ago, now distort these forest cover numbers. The impact of the bloody civil war between 1983 and 2009 on natural systems has yet to be fully studied. Some areas suffered significant scarring while parts, such as the Vanni (the mainland area of Sri Lanka's northern province), were depopulated and forest cover increased. The future of northern forest areas is not secure as some see this as an opportunity to develop shrimp farms, timber, mining, and other extractive industries.

FACING PAGE *The World Heritage Site of Sinharaja in south-western Sri Lanka has been the site of several important ecological restoration efforts. The boundary, as seen in this image, is composed of a mix of small plots, tea cultivation, timber plantations and mixed forests.*

CLOCKWISE FROM UPPER LEFT *Saltwater crocodile* Crocodylus porosus *in Colombo's Weli Park, an urban wetland that shows clear evidence of unintentional rewilding in the heart of Sri Lanka's capital city. Seeds of* Cullenia ceylanica*, an endemic late successional lowland rainforest species that will only establish itself once restoration is well underway. Lyre-nosed lizard* Lyriocephalus scutatus*, a flamboyant Sri Lankan endemic that the author found in a degraded set-zone forest undergoing succession and restoration.* Pinus caribaea *plantation being overtaken by site-specific native species in the successful trial plot set up by Professor Nimal Gunatilleke and others on the north-west edge of Sinharaja. Serendib Scops Owl* Otus thilohoffmanni *at a day roost in recovering plantation/secondary forest outside of the Sinharaja core zone. Winged seed of* Dipterocarpus zeylanicus*, one of the late-successional species that is widely planted in restoration plots in the Sinharaja area. Leaf insect (most likely* Phyllium bioculatum*) found in restored and recovering semi-evergreen forest in the Dy Zone near Popham's Arboretum.*

RESTORATION TO THE FORE In response to the challenges there is a broad-based consensus that more needs to be done to protect Sri Lanka's natural heritage. Increasingly, ecological restoration is an important part of the conversation. Several groups, including NGOs, large hotels and government agencies, are working on restoration projects in a variety of habitats in the diverse climatic zones of the island. The Sri Lankan Government is partaking in the United Nations Decade on Ecosystem Restoration. These efforts involve a wide variety of different habitats, ecosystems and stakeholders.

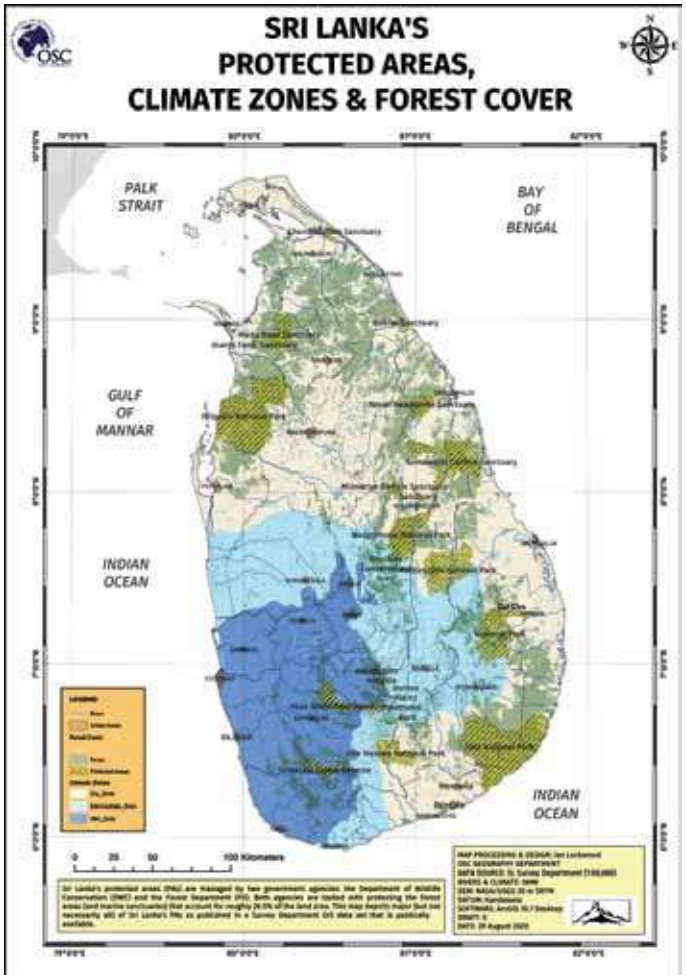
POPHAM'S ARBORETUM A pioneering effort to put ecological restoration to work in a time when the concept was not in the public discourse happened at Popham's Arboretum, in the dry zone forests at the centre of the island. This part of Sri Lanka, with the iconic Sigiriya rock, is more famous for its architecture and cultural

significance. Observing freshly-degraded forests, Sam Popham, a retired English naval officer and tea planter, set about restoring a small patch of *chena* (slash and burn) land that he had purchased on his pension. At a time when fast-growing tree varieties were all the rage of afforestation programmes, he used indigenous species. Over the course of many years, Popham developed what he called 'assisted natural regeneration' to bring back the dry zone forest. Although he passed on in 2022, Popham's Arboretum is thriving and is open to the public to showcase his methods. The forest has regenerated and become a home to a variety of plant and animal species. His methods have had an impact – other individuals and hotels have applied similar approaches (one example is Dr. Ranil Senanayake's experiment with analog forestry at the Belipola Arboretum). Notably, these dry zone forest restoration sites have seen a return of key species such as fishing cats *Prionailurus viverrinus* and the grey slender loris *Loris lydekkerianus*.

SINHARAJA'S SURPRISE The most important example of ecological restoration in Sri Lanka took place through a curious combination of unplanned and deliberate interventions in the southwest wet zone. Sinharaja rainforest, a celebrated World Heritage Site, was the setting for these events (see Sinharaja - The Heart Of South Asian Biodiversity). Today, the area is known for its lowland rainforest dominated by Mixed-Dipterocarp Forest (MDF), and astounding biodiversity. However, starting in the 1960s and up into the mid-70s the forest was being selectively logged for industrial production of paper and plywood. It was a different age, and the leaders of the time looked to utilise nature and wild resources for immediate human benefit. Large swathes of the forest that now make up the core zone were gutted. The plan was to harvest a 'sustainable yield' of timber – which was a nice theoretical concept that environmental managers championed, but had unintended consequences. Skid trails were put in to access forest areas; these ended up devastating much larger areas than intended. Grainy colour prints from the time show how mechanised logging reduced valleys to muddy wastelands. The loggers, led by Canadians, used to operating in temperate conditions, had little appreciation for what they were destroying. The Forest Department originally planned to replace the logged forest with fast-growing, non-native mahogany *Khaya senegalensis*. The area's biodiversity was simply not a part of the long-term plan or calculation.

It took a people's movement and a few far-sighted leaders to stop the logging and notify the main parts of Sinharaja as a protected site. Several students from Sri Lanka's leading universities were studying aspects of the forest; they would go on to lead long-term studies that would record just what a treasure trove Sinharaja was. The focus was on stopping the logging, and that was achieved. But what of the valleys and hillsides that had been ravaged by the logging?

Over the years, with consistent protection and virtually no human impact, a miracle unfolded in Sinharaja, illustrating the resilience of tropical rainforests when given a chance. Nature, once allowed to do its part, self-regulated and healed its wounds. Processes of ecological succession (see box on page 64) were vital to Sinharaja's recovery. In the core area, significant neighbouring ridge forests and other patches of inaccessible forest had survived the ravages of logging. These species fruited and seeds were dispersed by wind, water and the creatures of the forest. Slowly but surely, and then at a rapid pace, the rainforest regenerated itself at all trophic levels. Recovering forests provided a home for the emblematic endemic species and mixed-species bird flocks that visitors now seek.



ABOVE *Sri Lanka's Protected Areas are spread across three major climatic zones (wet, intermediate and dry). There are countless restoration and rewilding efforts in all three zones.*

Blocks of Sinharaja were initially mapped as either primary (unlogged) forest and secondary (logged) forest or timber plantations (mainly *Pinus caribaea*). Today it is virtually impossible to detect signs of the violence that logging had scarred on Sinharaja's heart. The

REWILDING

Definition: "Rewilding is the process of rebuilding, following major human disturbance, a natural ecosystem by restoring natural processes and the complete or near complete food web at all trophic levels as a self-sustaining and resilient ecosystem with biota that would have been present had the disturbance not occurred. This will involve a paradigm shift in the relationship between humans and nature. The ultimate goal of rewilding is the restoration of functioning native ecosystems containing the full range of species at all trophic levels while reducing human control and pressures. Rewilded ecosystems should – where possible – be self-sustaining. That is, they require no or minimal management (i.e., *natura naturans* [nature doing what nature does]), and it is recognised that ecosystems are dynamic." (Carter *et al.*)

Experiments in 'Analog Forestry'

Systems ecologist Dr. Ranil Senanayake has pioneered what he has coined as 'analog forestry'. This is a method of ecological restoration "that creates ecologically stable and socio-economically productive landscapes. Analog forestry is a complex and holistic form of silviculture, which minimises external inputs, such as agrochemicals and fossil fuels, instead fostering ecological function for resilience and productivity. Analog Forestry values not only ecological sustainability, but recognises local rural communities' social and economic needs, which can be met through the production of a diversity of useful and marketable goods and services, ranging from food to pharmaceuticals and fuel to fodder" (IAFN). The Belipola Arboretum in the Central Highlands has been the site of the first Sri Lankan experiment in Analog Forestry.

once-paved logging roads have disappeared and concrete bridges have tumbled into streams. A towering canopy of different species covers areas that were bare. *Calamas ovoideus*, a species of cane that loves sunlight and grew up with the mid-successional species, has peaked in secondary forest and is now dying out as climax species take over. Late successional trees of the MDF species are on the return.

TIMBER PLANTATIONS TO RAINFOREST Nature provided the catalyst in the core of Sinharaja, but on its edges, a little help from human hands brought about equally exciting changes in restoring degraded habitats. Starting in the 1980s, scientists from Peradeniya University and the Yale School of Forestry, under the Smithsonian Tropical Forest project, initiated a long-term study of one hectare of primary forest in Sinharaja. Their landmark studies helped to document patterns in floral diversity and demonstrate Sinharaja's richness. Several scientists from these collaborations experimented with restoring Sinharaja's degraded edges. The findings of these efforts were published this summer in a book titled, *Ecological Restoration.*

Sinharaja's boundary had been planted with fast-growing *Pinus caribaea* to mark its boundary, and perhaps for eventual use as a source of timber. These plantations of Mexican trees were of little ecological or economic use in the Sinharaja context. Starting as early as 1991, a few plots were identified to bring back the rainforest. The key approach was understanding forest dynamics and site-specific plants that would kickstart processes of ecological succession. Quantified experiments were run on the plots clearing single, double and triple lines of *Pinus* and trying out different early successional species. Collaboration with the Sri Lanka Forest Department was critical. At first, it was challenging to shift them from a monoculture to a mixed-native-species approach. That shift in perceptions – from afforestation to one promoting biodiversity – is a fundamental shift of world views and practical approaches that has been fundamental to global approaches today. Planting medicinal and herbal species that would have local benefits for the human communities on the edges of Sinharaja was an important strategy to garner support.

I happened to be an accidental witness to the changes in the edge plantation plots of Sinharaja where Nimal Gunatilleke's experiments in the *Pinus* plantation were being conducted. I have been visiting Sinharaja three to four times a year since 2000. I take annual study groups there and also visit on my own to look for birds, reptiles and

BELOW *Colombo's urban wetlands enjoy protection that have contributed to the city being named the first urban Ramsar city. Efforts are now underway to better protect these habitats. The author's students are in a kayak clearing out water hyacinth from the Talangma wetlands as part of a restoration effort.*

Ecological Succession and Restoration

A key concept in the field of ecology is ***ecological succession***, a process in which degraded ecosystems (or new landscapes) undergo a series of predictable steps as they go from pioneer communities to climax systems. Most ecosystems are dynamic and are always going through natural processes of change. In terrestrial systems, abiotic factors such as soil moisture and sunlight can play a critical role in what species survive and flourish. Productivity increases and then stabilises while mature ecosystems support greater diversity. Professor Nimal Gunatilleke and his colleagues have conducted long-term studies that have shown how important an awareness of natural stages of succession is when conducting restoration efforts. Many restoration (and afforestation) efforts have failed when inappropriate species have been planted. The lesson from several study plots in Sri Lanka is clear: keep in mind the stage of succession at which the landscape is at and what species would normally thrive there before you start. For example, in cleared forest land that has been overgrown with weeds, there is little point in planting climax species that need shade conditions. It is better to start with sun-tolerant, mid-successional species and then phase in the climax species once shade and soil conditions have been established. The more that humans can try to mimic stages of ecological succession the greater success they will find in restoring and rewilding damaged landscapes.

amphibians. Mostly I seek solace in the forest and the community of people who have opened up their homes to me, my students and friends. Taking the long route up to Martin's Jungle Lodge (where all good birders stay) you pass through a boundary patch of *Pinus*. This is where teams have been thinning the forest and planting succession-appropriate species. I was aware of the efforts but not really paying attention to the speed of change. On my last visit in May, I was astounded by just how well the native vegetation had grown. After nearly two decades of growth, the *Pinus* is dying off to be replaced by strands of *Canus* and other mid-successional species. On walks with Sinharaja's guides, we found key endemic wildlife including the Sri Lanka Blue Magpie *Urocissa ornata*, Sri Lanka green pit viper *Trimeresurus trigonocephalus* and long-snouted tree frog *Taruga longinasus* in the restoration plots. Down in the valley near Kudawa, *Pinus* forests undergoing succession have become the best-known localities for key bird species such as the Serendib Scops Owl *Otus thilohoffmanni*. Knowing how well the process of ecological succession worked in the core zone, we can expect a healthy recovery of this area. The hope is that the plot demonstrates how Sri Lanka's rainforests can be restored by following steps that recognise the importance of site-specific ecological succession.

BALANCING FOR THE FUTURE I live on the eastern outskirts of Colombo near the administrative capital of Sri Jayewardenepura. The area is remarkable for its wetlands, which have been protected and safeguarded from 'development efforts'. These areas help absorb rain bursts and mitigate flooding. I use them as living classrooms and often spend my weekend mornings wandering around these spaces with binoculars. I'm blown away at how they are turning into fine sanctuaries, hosting species that you would normally not expect in an urban setting. Invasive species such as water hyacinth *Eichhornia crassipes* pose a serious challenge to Colombo's urban wetlands but individuals, government agencies and NGOs are working to remove

ABOVE *Beddagana Wetland Park is an urban wetland ecosystem in Colombo that has been restored from a garbage dump and construction site. It hosts a variety of species including resident and migrant birds. The wetlands act as an important flood control mechanism and are popular with residents as a place for walking, wedding shooting and bird photography.*

them and bring back a state of ecological balance. Processes of ecological succession are taking place in the urban wetlands – something that is evident not only in the floristic community but in the animals that thrive in the urban wetlands. Fishing cats *Prionailurus viverrinus,* Eurasian otters *Lutra lutra*, and saltwater crocodiles *Crocodylus porosus* have all found homes in these urban wetlands. Birdlife is impressive and the migration season is delightfully diverse. Like some other rewilding efforts, these were not targeted introductions. However, once the habitat was protected and allowed to thrive, the species have found a home amongst the hustle and bustle of human activities. The challenge for Sri Lanka is to balance these wild neighbours with human needs. Based on the island's long history of human-wilderness coexistence, there is every reason to be optimistic for the future.

Tourism and Nature in Sri Lanka

The tourism industry in Sri Lanka, a vital part of the economy, emphasises natural experiences. All good tourism promotional media advertise wild encounters with elephants, leopards and/or whales in addition to the gorgeous beaches, rolling tea estates and heritage of the cultural triangle. For the most part, this has been good for wilderness protection and efforts to achieve better environmental stewardship. The role of tourism is such that it makes good economic sense to protect and manage wilderness areas rather than divert them for other uses (mining, forestry, agriculture, etc.). Many communities living next to Protected Areas have a vested interest in tourists visiting these sites.

PUBLIC DOMAIN/AXEL FASSIO/CIFOR

CAN REWILDING SAVE THE PARIS AGREEMENT?

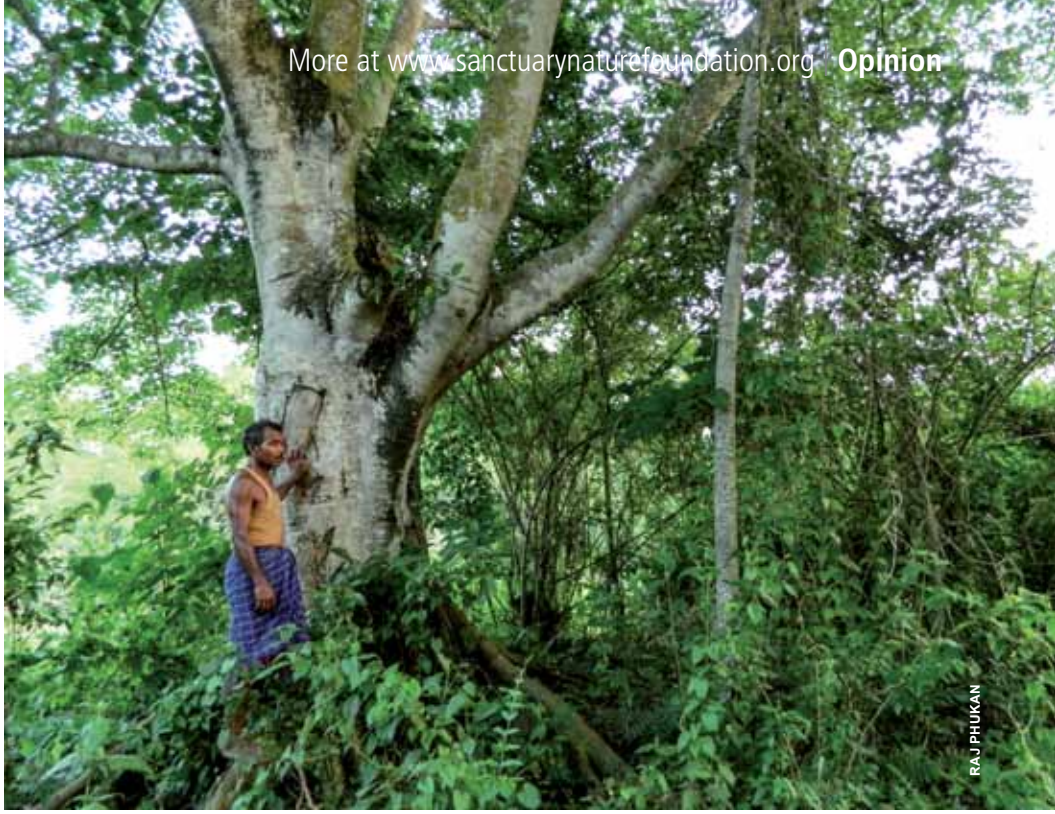
By Shailendra Yashwant

Not very long ago, on an island on the Brahmaputra river, Jadav Payeng of the *Mishing* tribe of Northeast India, a man of few means but a lot of determination, who had raised and nurtured a forest for 30 years told me, "No more global warming, if everyone plants forest," when I interviewed him for *Sanctuary Asia* magazine. His was a solitary, selfless rewilding mission driven by intuition and compassion, and his forest stands tall today, giving shade and sanctuary to a myriad creatures in almost 150 hectares... and counting.

Around the same time, in far away West Sussex in England, Charlie Burrell and Isabella Tree started rewilding their loss-making farm estate into what is now known as Knepp Wildland, a 1,400 hectare rewilding project, which plays home to a variety of wildlife, including critically endangered nightingales and Turtle Doves. Meanwhile in Spain, Black Vultures, lynx and wild horses are among the animals that are being reintroduced with the launch of a rewilding project spanning 850,000 hectares in the Iberian highlands east of Madrid.

ABOVE *A reforestation project in Kisangani, DRC. Rewilding is complementary to existing ecological restoration and conservation approaches.*

COMMITTING TO REWILDING The Global Rewilding Alliance, created in 2020, suggests that rewilding the Earth will "stabilise the climate, halt mass extinction, and reduce



ABOVE *Jadav Payeng, Sanctuary Wildlife Service Award 2012 winner, in the forest he planted and nurtured for over 30 years. "No more global warming, if everyone plants forest," he told the author.*

the risk of new pandemics". Rewilding is best defined as restoration to promote self-regulating complex ecosystems through restoring non-human ecological factors and processes, while reducing human control and pressures. Rewilding is an idea that sits within and is complementary to existing ecological restoration and conservation approaches.

Not surprisingly, rewilding projects have been initiated around the world as a response to our biodiversity and climate crises. Both are intrinsic to critical initiatives including the UN Sustainable Development Goals, the Decade on Ecosystem Restoration, Global Biodiversity Framework, Nature-based Solutions (NbS), and uncounted human health initiatives.

The latest report of the Intergovernmental Panel on Climate Change (IPCC) direly warned that we are unlikely to achieve the goals of the 2015 Paris Climate Agreement to cut all sectors in half by 2030, let alone reaching net zero emissions by 2050. However, the report tempers that message by stating that if we act now, and act fast, we can still correct course. This would involve reducing annual emissions by billions of tonnes of CO_2-equivalent ($GtCO_2$-eq) between now and 2050.

One of the five quick means to achieve emissions reduction, according to the IPCC involves "reducing the conversion of natural ecosystems" (4.0 $GtCO_2$-eq/year reduction) and restoring, afforesting and reforesting ecosystems (2.8 $GtCO_2$-eq/year reduction). This would help meet nearly half of the Paris Agreement targets, while the rest would be a result of increased renewable energy uptake and soil sequestration from agricultural adaptation.

The report also hones in on the importance of maintaining the adaptability and resilience of natural species and ecosystem functions and services by ensuring "effective and equitable conservation of approximately 30 to 50 per cent of Earth's land, freshwater and ocean areas".

The inalienable truth is that species constituting Earth's plant and animal biodiversity regulate the planet's ecosystems, thus helping to bring our climate back to balance. More than 99 per cent of the four billion species that have evolved on Earth are now extinct. A 2019 report from the UN found that currently around one million animal and plant species are facing extinction, many within mere decades, a rate unprecedented in human history.

WHY REWILD? Protecting and conserving forests can reduce the risk of zoonotic diseases, such as coronaviruses, anthrax, and tuberculosis. Emerging evidence shows that one in three outbreaks are linked to deforestation and

Research shows that investing in forests can lift one billion people out of poverty, create 80 million green jobs, and contribute to enhancing environmental and social resilience.

THE GLOBAL REWILDING ALLIANCE

A 2019 report from the UN found that around one million animal and plant species are facing extinction, many within mere decades. These rates are unprecedented in human history.

land use changes. Economic research reveals that investing in forests can lift one billion people out of poverty, create 80 million green jobs, and enhance environmental and social resilience.

Land could be our greatest ally in fighting climate change, provided we work to restore terrestrial ecosystems back to health. One in every five hectares of land has been rendered unfit to deliver the ecological services they used to perform. By some accounts, restoring just 350 million hectares of degraded land could, by 2030, remove greenhouse gases approximating half the globe's annual atmospheric emissions. Inaction or procrastination is irresponsible and unforgiveable, particularly when virtually all nations signed on to rapidly reduce their carbon emissions to meet the life-or-death Paris Agreement goals.

The United Nations (UN) declared 2021-2030 as the UN Decade on Ecosystem Restoration with the explicit aim "to prevent, halt, and reverse the degradation of ecosystems on every continent and in every ocean," to help end poverty, combat climate change and prevent mass extinction. Restoration will only have a meaningful impact on the biodiversity and climate crises when nations recognise the common threat, and use strategies such as Accelerated Carbon Capture (ACC) across vast proportions of land and sea.

Encouragingly, a vast number of countries and corporations made unambiguous commitments to keep the land healthy during the UN Decade for Deserts and the Fight against Desertification, which ended last year. Over 100 countries are now pursuing Land Degradation Neutrality goals through the UN Convention to Combat Desertification. This is 450 million hectares of commitments and counting – roughly half of the one billion in global restoration commitments to date.

The task before 'ordinary people' is to hold those in positions of power to the promises they make, but often forget. Towards this end, young people are raising their voices and its time their elders did right by their progeny.

CAN REWILDING SAVE THE CLIMATE? According to a recent study 'Trophic rewilding can expand natural climate solutions' published in the journal *Nature Climate Change*, protecting wildlife and restoring species populations around the world could supercharge ecosystem carbon sinks and thereby dramatically enhance carbon capture and storage.

Rewilding plant and animal populations to enhance natural carbon capture and storage, or 'Animating the Carbon Cycle' (ACC) (see page 37) demonstrates how wild species play a critical role in controlling the carbon cycle in terrestrial, freshwater,

PUBLIC DOMAIN/JEAN BEAUFORT

American bison in the snow. Protecting and restoring wild species can supercharge ecosystem carbon sinks.

and marine ecosystems through a wide and complex range of processes.

Fifteen scientists from eight countries examined nine (see page 8) wildlife populations – marine fish, whales, sharks, grey wolves, wildebeest, sea otters, musk oxen, African forest elephants, and American bison. They discovered that protecting or restoring species populations could facilitate the capture of an additional 6.41 billion tonnes of CO_2 year on year (6.41GtCO_2-eq/yr)! They accomplish this by simply living; by foraging, rearranging their habitats' nutrient and organic carbon depositions, and through seed dispersal. The loss or absence of animals dramatically alters the dynamics of carbon uptake and storage.

Astonishingly, this is comparable to the potential CO_2 emissions reductions from solar, wind, and carbon sequestration in agriculture combined! What is more, this quantum of carbon capture amounts to 95 per cent of the Paris Agreement target promise to keep global warming below the 1.5°C threshold.

For its success, rewilding should be inclusive of all stakeholders and embrace participatory approaches and transparent local consultation in the planning process for any project.

Proponents of rewilding tend to highlight the shortcomings of business-as-usual biodiversity conservation strategies, arguing that rewilding represents a bold and proactive approach needed to tackle the unprecedented biodiversity crisis of the 21st Century.

They describe rewilding as an effective way to address the biodiversity crisis in an age of widespread anthropogenic global change, by unleashing the intrinsic resilience and transformative capacity of nature. But to be successful, any rewilding project should be inclusive of all stakeholders and embrace participatory approaches and transparent local consultation in the planning process. Rewilding must encourage public understanding and appreciation of wild nature and address existing concerns relating to human coexistence with wildlife and natural processes.

Shailendra Yashwant is an independent environmental journalist and senior advisor to Climate Action Network South Asia (CANSA).

COURTESY VISHAL AHUJA

A REWILDING JOURNEY IN CHAMBA

By Neyi Jamoh (with inputs from Vishal Ahuja)

Enamoured by the trees, wildlife and forests surrounding his Chamba Valley home since a young age, after obtaining a Master's degree in Botany in 2011, Himachal Pradesh resident Vishal Ahuja followed his passion for conservation and joined a study on the distribution of the Himalayan grey langur (also known as the Chamba sacred langur). The project involved mapping human-wildlife conflict zones, and documenting conservation challenges in Chamba.

This study, which was conducted in 2012 by Vishal and his team under the guidance of Dr. Sanjay Molur (Executive Director, Zoo Outreach Organisation; Founder Secretary, Wildlife Information Liaison Development Society, Coimbatore), heralded the birth of a rewilding project aimed at fostering human-animal coexistence in the Chamba Valley.

THE GROUND WORK A majority of communities living on the fringes of the Kalatop Khajjiar Wildlife Sanctuary in Himachal Pradesh are farmers. Over the years, with the extension of farming areas, uncontrolled grazing by cattle, and unsustainable use of forest-based resources, coupled with climate change, the pine-oak mixed forests near villages were severely degraded. In 2014, a follow-up study in 12 highly conflict-prone villages surrounding the wildlife sanctuary helped the team understand local people's perception of crop depredation and loss, and helped document possible ways to mitigate human-animal conflict (as suggested by locals). Two related studies conducted by Vishal in February-March in 43 villages and in 53 villages in November-December in 2016 revealed that wildlife such as Himalayan black bears, rhesus macaques, Himalayan grey langurs, and porcupines caused farmers to lose a major portion (57.17 per cent) of their expected yield to depredation, a fact that explains the presence of several abandoned terraced farms. During the questionnaire survey, Vishal and his team also learned that encounters with Himalayan black bears had turned fatal for a few locals, aggravating the atmosphere of fear of and ill-will against certain wildlife species in the region.

PUTTING TWO AND TWO TOGETHER Empowered by these findings, the team asked basic but relevant questions in this context, such as, why wild animals risk their lives to feed on crops when they have ample food in the forest. Between 2017 and 2019, Vishal compared the floral diversity and distribution within the wildlife sanctuary to that of the fragmented forest patches around villages. Additionally, his documentation of the diet preference of the Chamba sacred langur and other wildlife led to the understanding that a) wildlife visited farmlands in search of food resources, and b) degraded habitats within fragmented forests do not harbour sufficient stock of native flora that form the diet of several wildlife species. These

Vishal's experience in Chamba underscores that winning local community support and participation is essential to the success of long-term rewilding endeavours.

findings further helped unravel the obvious but seemingly-elusive point – that the availability of native flora that forms the food base of wildlife is crucial to maintaining a healthy human-wildlife relationship in Chamba.

REWILDING IS A SOCIAL AND ECOLOGICAL PROCESS Based on the learnings of over eight years of scientific studies, constant interactions with locals, and countless field visits, Vishal's team was convinced that restoring native flora within severely degraded and fragmented forest patches was one of the most important steps to mitigating human-wildlife negative interactions in Chamba. It made sense to approach the issue in a manner close to nature's ways of working – restoring in a slow yet deliberate manner to restock native flora for the region's wildlife.

At the start of his rewilding initiative in 2020, Vishal conducted one-on-one interviews with locals, sharing details about his long-term project. Most of his days were spent reconciling people's hesitations and gaining acceptance for non-local volunteers, who would eventually work on the project in the coming months. Two years into the project, Vishal has learned that saplings planted on privately-owned lands survive and grow better than those planted on open forest lands, where care and protection against grazing by livestock are lacking. Further reiterating the importance of community support, he also observed that local support helped reduce project costs for plant protectors. "At a time when locals were continuing to incur economic loss on account of depredation and facing fatal attacks from wild animals, convincing them to save wild animals and forests was not easy. However, with consistent efforts and outreach, many people now understand the root cause of the problem and have begun to accept rewilding as a possible solution," says Vishal.

Additionally, camaraderie with the Chamba Forest Department by actively participating in departmental-led activities such as annual bird counts enabled Vishal to push for a research-based approach to rewilding degraded forests. In October 2022, after two years of planning based on field conditions, keeping up with the Forest Department's schedules, and perseverance on Vishal's part, he led a 21-member team, conducting the first-of-its-kind census of the Himalayan grey langur. This will strengthen long-term conservation plans for the shy endemic primate, which will, in turn, impact the approaches of the rewilding projects he leads.

COURTESY VISHAL AHUJA

ABOVE *With the support and participation of local farmers, over 800 saplings of native species were planted at the Rathiyar Panchayat in the monsoon season of 2022.*

FACING PAGE *Since 2020. Vishal has been interacting with several members of the local community to garner support for the rewilding project in Chamba. Here Vishal is seen speaking to a group of farmers at Kakela village, Chamba District, Himachal Pradesh.*

REWILDING CHAMBA – A WORK IN PROGRESS Just as the process of rewilding is a slow but deliberate one, the journey of choosing rewilding as the suitable conservation approach for a region should be intentional and gradual, and based on sound science. Vishal's experience underscores that winning local community support and participation is essential to the success of long-term rewilding endeavours. Also, that this entails reworking plans based on field conditions and community sentiments, as well as winning the cooperation of the local Forest Department.

Vishal has also focused on keeping up with the latest research and rewilding approaches to successfully build a well-informed rewilding plan for his home valley. In June 2022, he spent 20 days working with and learning from experts at the Nature Conservation Foundation, in Valparai (Tamil Nadu), Pondicherry's Pitchandikulam forest, and in the Nilgiri Biosphere Nature Park at Anaikatti. Here he gleaned invaluable learnings on how to restore degraded forests and raise nurseries of native plants.

Between 2020 and 2022, supported by Sanctuary's Mud on Boots Project and the active participation of local farmers from Rathiyar Panchayat, Vishal carefully oversaw the plantation of over 1,500 saplings of native trees on degraded forests and abandoned terrace farms.

In January 2023, with funding from the Astral Foundation, Vishal leased an area of 752 sq. m. at Dugli village, thus fulfilling his decade-long dream of establishing a functional nursery of native plants. Here, using his knowledge of the ecology of local flora, Vishal and his team successfully raised 1,600+ saplings from seeds and cuttings. "I work at the nursery to raise local species of saplings to plant in degraded forests as food for wildlife. I expect that, eventually, our crops will be saved from depredation as wildlife will have access to their food," said Shakti Pal, a farm owner who is permanently employed at the nursery.

THE ROAD AHEAD Since 2020, Vishal has doggedly led all aspects of the rewilding project in Chamba. With support from the Mud on Boots Project, mentored by Dr. Sanjay Molur, he is exploring more funding opportunities to run the nursery. His work currently focuses on the Rathiyar Panchayat, but he hopes to take on additional areas over the next five years, with support from community members and in collaboration with the District Administration as well as the Forest Department.

In the final analysis, individuals such as Vishal can and will make a difference because they believe viscerally that working with nature will improve the lives of people and the wild species with which their lives are entwined.

IT'S A BIRD-EAT-BIRD WORLD

Sometimes you need to give the king of the jungle a miss for something even more spectacular. We had just left the scene of an overcrowded tiger sighting, with a throng of tourist vehicles literally mobbing the carnivore. We were in the Tadoba-Andhari Tiger Reserve and as we moved away, we noticed two chital deer, their antlers in velvet, intently staring at the tall grass. We paused for several minutes before, to our utter delight, a flash of white amid the grass revealed a Changeable Hawk-eagle *Nisaetus cirrhatus* over a Cattle Egret.

Forest-dwelling raptors, these avian predators are so named for their two colour morphs – pale and black. Found across much of the Indian subcontinent and Southeast Asia, these magnificent raptors will kill and eat virtually anything they can overpower. Birders confirm having seen them consume small prey ranging from amphibians, reptiles and rodents, to birds and mammals. Their feathery crests are a key identifying feature, though this adornment may be absent in the black morph!

The eagle took off right after we spotted it, but fortunately my camera was at the ready and I managed to grab a decent frame before it left to perch on a nearby tree to consume its kill at leisure. Keeping a respectable distance, my daughter and I enjoyed watching the process of defeathering and eating for a while as we discussed the circle of life. Natural feelings of sympathy for the prey had to be balanced against empathy for the predator that needed to hunt to survive. We also spoke about how everything in nature is kept in balance and how 'eat or be eaten' is an ancient rule in the wild.

Humbled and awe-struck by what we had witnessed, we moved away, leaving the forest and its denizens to their endless life-and-death fate.

PHOTOGRAPHER: Hemant Krishnani
LOCATION: Tadoba-Andhari Tiger Reserve
DETAILS: Camera: Canon EOS R6 Lens: RF 100-500 mm. f/4.5-7.1 IS USM, Aperture: F/5.0, Shutter speed: 1/8000, ISO: 3200, Focal length: 223 mm.
DATE: November 15, 2021; 2:28 p.m.

HEMANT KRISHNANI

LET RIVERS FLOW FREE:

The Case for Decommissioning Dams in India

Text by Bhavya Iyer

A SEISMIC BLUNDER? The Dibang river originates in the Mishmi Hills of Arunachal Pradesh and winds through a steep, rolling valley before forming braided channels in its lower reaches, eventually joining the Lohit river to form the Brahmaputra, a lifeline for the region. The Dibang valley is home to dense forests and unique wildlife, from the hoolock gibbon and Mishmi takin, to the clouded leopard and Sclater's Monal. Yet on the Dibang river alone, more than 17 hydropower projects are in various stages of planning.

Nearly 80 per cent of Arunachal Pradesh is covered in dense forests situated on a rocky base – the state lies in Earthquake Zone 5 (the regions with highest risk of suffering a major earthquake). Despite this, about 150 hydropower projects have been proposed in the state. A major hydropower project planned on the Dibang river has been facing immense public resistance since 2008, over what is seen as mindless development that could have disastrous implications for the ecological security and safety of the state and downstream areas, which include parts of Assam. The proposed Dibang Dam would have installed capacity of nearly 3,000 MW of power. In comparison, the current largest hydropower capacity project, the Nathpa Jhakri project in Himachal Pradesh, has an installed capacity of 1,500 MW.

The rationale of constructing dozens of mega dams in a seismically hazardous zone is questionable, especially when large hydropower projects are no longer economically viable (their social or ecological viability were always a big question mark), and the private sector is no longer interested in them. These projects are even more unviable considering the changing climate implications. Meanwhile, a proposal for an 11,000 MW project on the Siang river in Arunachal, was submitted in January 2023.

What do we lose when we dam rivers, and block river valleys, stemming the flow of river water flows, silt flows, biodiversity flows and everything else that flows in the river, with mountains of mortar and cement? India's first Prime Minister Jawaharlal Nehru regarded dams as an integral part of nation-building, referring to the dams built in the early years after Independence as the 'Temples of Modern India.' In an era of big dams, these grand feats of engineering were foolishly considered a symbol of human power to control and channel nature. Nehru himself changed his opinion a few years later, saying that such big projects reflected "a disease of gigantism". Prayers can be effectively offered even at smaller places of worship!

COSTS EXCEEDING BENEFITS For decades, dams have been built, bigger and bigger, ostensibly for irrigation, hydropower generation, water storage and supply, and flood control. The acceptable collateral – loss of natural habitats, from forests to open natural ecosystems (ONEs), relocation of people from project sites and increased poverty in dam districts, greater disaster potential both in the upstream, at dam sites and the downstream, river erosion on account of a lack of sediment flow besides tunneling, blasting and deforestation,

BELOW *The Dibang valley is home to dense forests and endemic wildlife, from the hoolock gibbon and Mishmi takin, to the clouded leopard and Sclater's Monal – all threatened by more than 17 hydropower projects in various stages of planning and implementation on the Dibang river.*

SAURABH SAWANT

impacts on water security and flooding, and obstructions to wildlife movement and natural habitat movement. Himalayan rivers are being increasingly eyed for their 'hydropower potential', with India using the supposedly-green source of energy to fulfil global commitments to reduce carbon emissions. However, expert after expert warn that these claims are unfounded, these projects could spell multiple disasters for the fragile mountain ecosystems, with dams being held responsible for increased flooding, land subsidence and landslides in mountain states such as Arunachal Pradesh, Himachal Pradesh and Uttarakhand.

These impacts have, until recently, been seen as worth the 'benefits' from the building of dams. However, the advantages of dams, especially large ones, are now being called into question, with hydropower projects failing to fulfil their promised benefits and delivering unpromised disasters, dam-building exacerbating flood damage, and the destruction of forests increasing habitat loss and fragmentation and heightening human-wildlife conflict. The decreasing per unit cost of alternatives like solar and wind power, much less than that of hydropower, further calls into question the rationale of mega hydropower projects.

BACK TO NATURE A movement to 'rewild' dams by tearing them down – in a systematic, step-wise, scientific manner – and restoring erstwhile riparian habitat has been growing across the globe. Rewilding Europe, a citizen-led NGO, is leading a movement for removal of dams and habitat restoration across Europe, resulting in 325 dams being removed across Europe in 2022 alone and over 2,000 removed in USA over the last decade or two. Dam removals in various countries – the Elwha Dam in USA, a dam on the Gudenå river in Denmark, the Maisons-Rouges Dam in France – have shown a resultant recovery in biodiversity and fish numbers. Dam decommissioning is also cheaper, safer and more beneficial than maintaining ageing and obsolete dams. Dam removal, especially for large ones, can take years to safely carry out, as the original river channel must be excavated, built-up sediment must be carefully released, and layers of the dam must be removed to allow water levels to drop. However, case after case shows the benefits accrued to nature and local communities by the removal of dams, from habitat restoration to fish stock recovery, wetland revitalisation, improved safety of downstream and upstream habitats and increased biodiversity.

DAMMED IF WE DON'T Let's rewind – India has over 5,300 large dams. A large dam is one with "a height of at least 15 m. from its deepest foundation to the crest", according to the Central Water Commission (CWC). This makes India the country with the third highest number of large dams, after China and USA. But what about dams under this 15 m. threshold? The Ministry of Water Resources and CWC has no data on small dams and minor irrigation dams. One article reports over 70,000 small dams and irrigation projects in Maharashtra alone (less than 12 per cent of the irrigation potential of which is utilised). In comparison, USA has roughly 91,000 dams across the country. Over 234 of our large dams are over 100 years old, and their safety is in question. By 2025, India will have over 1,000 large dams over 50 years old. Most dams constructed at the time had a lifespan of 50 to 100 years, posing significant safety risks to downstream communities. The potential for dam removal and habitat restoration in India is massive. Removing these dams, starting with the defunct and ageing ones, would not only restore vast swathes of habitat and help revitalise wetlands, but also provide rural employment, increase ecotourism potential, and improve fisheries.

ABOVE *A dam on Arunachal Pradesh's Ranganadi river. Himalayan rivers are being increasingly chosen for their 'hydropower potential', despite warnings that these projects could result in multiple disasters for the fragile and biodiverse mountain ecosystems.*

In USA, thousands of dams have been removed in the last 50 years. Europe is in the middle of a waterway revitalisation movement through citizen-led dam decommissioning and habitat restoration. The era of large dams has passed, and the time to rewild riparian habitats is here. With so many obsolete dams, and no dearth of funding available for habitat restoration and rewilding at the global stage, India is primed to lead the way in this movement, and should not let go of this opportunity.

What You Can Do

- Keep up to date on planned mega hydropower projects in your region, participate in the public hearing process for these projects wherever possible and learn about the various ways in which other countries are making a successful transition from mega-dam dependence.
- Consider what local and Indigenous communities have to say about such projects, whether they will lose their lands, livelihoods or forests, and help amplify their voices through social media. Support local communities, use the *Right to Information* Act to get information about existing large dams.
- Write to your civic representatives and state and union environment ministers and convince them that mega hydropower projects are not green energy, and will do more harm than good. Rather than focusing on destructive mega projects, we should focus on small-scale electricity generation such as rooftop solar and smaller run-of-the-river hydropower projects and work towards restoring and rewilding our rivers and streams.

PUBLIC DOMAIN/DINESH VALKE

Planting Pioneers

Today, with awareness increasing about degraded landscapes, plummeting biodiversity, and the rising threat of invasive species, when it comes to ecological restoration, knowing what to plant where is the topic of discussion *du jour*. And by and large, the limelight seems to be on one major player in the arena – native species. The virtues of planting natives have been extolled time and again by ecological practitioners, government agencies, and eco-warrior laypeople alike, but if I've learnt anything from observing the natural world, it's that the answer is never that simple. Before attempting to grow or re-grow our forests, we must ask the question – how do forests grow in the first place?

Most native species – especially the kinds of larger trees and shrubs enthusiastically promoted by afforestation efforts – can be remarkably fastidious. Evolved over millions of years to be adapted to just the right kind of microhabitat, if planted on a harsh degraded site, they simply wither away. Before these long-lived, slow-growing native species can take over, they need a gentler habitat to settle into, without which they can't establish dominance. In nature, there are certain plants which specialise in colonising harsh, degraded habitats, making them more suitable for other plants to take over – meet the Pioneers. This is a term used to refer to short-lived, rapidly-growing species, which have the ability to establish in varied soil conditions – shallow or deep; sandy, rocky or clayey; and acidic or alkaline. Their quick growth stalls soil erosion, creates a closed canopy overhead, and introduces nutrients and biomass back into the soil. Under this pioneer canopy, long-lived species (called climax species) can establish and eventually, when the pioneer generation dies, form a mature forest. By the time this happens, the forest changes entirely, and typically becomes more moist and shaded – conditions which the pioneers can't tolerate, but which ensure the continuation of the mature forest of climax species. This transition from pioneer to climax forest is called ecological succession – and it is the hidden weapon in the habitat restoration arsenal.

Therefore, the key is not to simply plant native trees, but also to plant native pioneers. But this may not always be easy. In the 1970s, the founders of the international township Auroville, in Tamil Nadu, faced the challenge of restoring the highly degraded land on which the township was founded. Efforts to plant native species largely failed, when the introduced Australian earleaf acacia tree *Acacia auriculiformis* suddenly took root with unprecedented success. The earleaf acacia is a typical pioneer species – it is extremely adaptable to variable soils, tolerates harsh sun and dry conditions, and lives only about 30-40 years. So the pioneer canopy in Auroville comprised a non-native species – in whose shelter the residents planted native saplings which today have begun to dominate the canopy of Auroville forests. In hindsight, the use of a foreign species as fecund as the earleaf acacia could be thought of as a formula for creating an incredibly persistent invasive species – and in fact in other habitats in India such as the western mangrove forests and the *shola* grasslands, the earleaf has become an invasive. In Auroville, an understanding of natural successional processes aided the restoration. Once a shaded canopy of native species was formed, the acacia ceased to reproduce as abundantly.

So, can non-native species aid in the rewilding of native habitats? It would seem so! However, one must remember that there is no silver bullet in ecology – every situation and every habitat is different from the next – and what works in one may not in another. The key is to constantly change our approach to suit the specific circumstances, and always look to nature for inspiration.

Further Reading:

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By Soham Kacker

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

PUBLIC DOMAIN/DINESH VALKE

ABOVE *Flowering of* Acacia auriculiformis. *When the founders of Auroville tried to restore their land,* A. auriculiformis*, a pioneer, took root with unprecedented success to form the pioneer canopy.*

FACING PAGE *A stand of* A. auriculiformis. *Once a canopy of natives was formed, the acacia ceased to reproduce as abundantly. Curiously, this non-native aided the rewilding of a native habitat.*

Sanctuary's

MUD ON BOOTS

July-August 2023, Bimonthly Report focused on species and habitat recovery across India

LOVE IS IN THE AIR IN GONDIA

Monsoon is the main breeding season for Sarus Cranes. In Gondia district (Maharashtra) and Balaghat district (Madhya Pradesh), Sarus Cranes choose relatively undisturbed areas of paddy fields to nest, with July and August being the peak months. And as they have done year after year, Project Leaders Kanhaiyalal Udapure and Shashank Ladekar continue to dedicate their time to monitoring nests, in collaboration with SEWA (Sustaining Environment & Wildlife Assemblage).

Though the delayed monsoon affected nesting, Kanhaiyalal and Shashank successfully located 10 active nests (three in Gondia and seven in Balaghat). Having established relationships of trust with the farmers in whose fields Sarus pairs nest, their efforts to locate new nests continued till the end of September. Once the nesting surveys are done, the duo will work to help farmers file for monetary compensation for crop losses suffered by setting aside parcels of rice fields so as not to disturb the cranes.

Kanhaiyalal and Shashank also began surveying heronries in the Chipiya and Chargaon wetlands, where they documented four avian species and as many as 124 nests. They simultaneously conducted nature awareness programmes for 110 primary-class students in two local schools. Guided by their mentor, Shivona Bhojwani, on August 10, 2023 they commenced work to set up a 'Seed Bank' of plants to restore degraded wetlands. Thus far, all four species of planted wetland plants seem to be doing well in the pilot plots they created.

TURNING BIODIVERSITY INTO LIVELIHOODS

In Koynardih village, Ranchi district (Jharkhand), July and August are peak farming months. Like most people in the village, Project Leaders Chamru Bediya and Sahebram Bediya belong to farming families and are no strangers to the drill that must be followed through these months.

While both were able to take advantage of the monsoon and spent considerable time tending their fields, balancing professional and personal responsibilities has been challenging. Carving time from their labour-intensive subsistence farming, the dedicated duo conducted seven nature walks, introducing 29 students to the basics of bird and tree identification. Imparting nature values and understanding through games, art and craft activities, the duo also participated in four parent-teacher meetings to win support of village families with whom consultations were held to highlight the importance of the region's forests and to create awareness about the impact of deforestation and hunting.

Meanwhile, 26 trees and medicinal plant species, 56 bird, four mammal, and 11 insect species were added to their expanding species list.

They also welcomed 52 tourists as part of a key ecotourism initiative run by Ekastha Foundation (their affiliate organisation) that showcased the biodiversity of the deciduous forests of the region. Such initiatives enable the rewilding of degraded parcels of land, with communities becoming the primary beneficiaries.

KANHAIYALAL UDAPURE

Paddy fields in Gondia, Maharashtra serve as home to nesting pairs of the Critically Endangered Sarus Crane.

COURTESY EKASTHA FOUNDATION

Carving time from their labour-intensive subsistence farming, Project Leaders Chamru and Sahebram conducted seven nature walks, introducing 29 students to the basics of bird and tree identification.

BIRDS, BUTTERFLIES, BARASINGHAS AND BAAGH

Project Leader Saddam Husain Lodha's village in the Haridwar District of Uttarakhand is located close to the Rajaji National Park. Saddam believes that green jobs can serve as sources of respectable and sustainable incomes for local youth. Keeping this long-term goal in mind, he is continuing to lead all aspects of the 'Maee Nature Training Course-2023'. When he saw that enthusiasm witnessed in the initial months seemed to be fizzling out, Saddam shifted focus to imparting knowledge on bird identification through weekly walks and treks.

The Maee Learning Centre and Library conducted a butterfly-rearing exercise, equipping students with knowledge on the lifecycle of butterflies. Through nature walks and short plays, the team explained the relationships between wild animals, birds, butterflies, forests and humans.

On the eve of *Harela* festival, the team worked with locals to plant over 200 saplings of forest tree species at degraded sites. Encouragingly, many children joined the effort to rewild their own lands, preparing the area for future plantations. Several adults took on the responsibility of caring for the planted saplings.

Additionally, Saddam's team continued to monitor swamp deer populations and prepare bird checklists in and around the Jhilmil Jheel Conservation Reserve.

MAKING LEMONADE

In Mandya district, Karnataka, Project Leader Jesu Das is using the traditional technique of cast netting to study and monitor fish species in the Cauvery river. Recovering from a severe hand injury, Jesu was unable to perform any cast net surveys over the past two months and chose instead to shift focus to outreach, and to conduct weekly water quality tests to ensure the well-being of the 11 humpback mahseer at the Bheemeshwari Humpback Mahseer Repository. Jesu is now able to confidently conduct the complex series of tests independently, and has trained two Forest Department personnel as well!

The Forest Department requested him to conduct an orientation and demonstration programme on how to catch and release fish, and, transport them safely to the repository. He also mentored an intern and assisted a Ph.D. researcher on the strategies used by the Wildlife Association of South India (WASI), to conduct stream surveys and water tests, and visually document vegetation and habitat features. While assisting another Ph.D. scholar studying invasive fish in the Cauvery in conducting qualitative interviews with local fishermen, Jesu shared his own mahseer conservation work underway within the Cauvery Wildlife Sanctuary.

Additionally, Jesu shared experiences gained while working to revive the Critically Endangered humpback mahseer in the Cauvery with a journalist (Amulya B.) of Village Square, who promptly reported on Karnataka's launch of a recovery project for the critically endangered, orange-finned humpback mahseer, a fish native to the Cauvery river.

COURTESY WASI

Project Leader Jesu Das perfected the water testing protocols and trained two Forest Department personnel.

COURTESY SADDAM HUSAIN LODHA

Saddam and his friends at Maee celebrated International Tiger Day 2023, with children at the Maee Learning Center and Library, Haridwar district, Uttarakhand.

NATURE TRAINING FOR TRAINERS

In an effort to strengthen the nature education programmes led by current Project Leaders in their respective landscapes, on August 28, 2023 the Mud on Boots team organised an online session, where experienced Project Leaders Manoj Gogoi, Saddam Husain Lodha, Chamru Bediya and Sahebram Bediya presented their ongoing nature education work. The session was part of a long-term engagement aimed at training Project Leaders to address location-specific challenges and become effective educators in the process. Designed in collaboration with NCF-India's Vena Kapur (Head, Nature Classrooms Project) and Priyanka Prakash, these Project Leaders are the face of young India taking charge of their own ecological futures. They will soon travel to the Pakke Tiger Reserve in Arunachal Pradesh to attend five days of field training on nature education designed by Dr. Pranav Trivedi, and coordinated by Saniya Chaplod and Tajik Tachang of NCF-India.

PROJECT UPDATES

The Sanctuary Nature Foundation's
Kids for Tigers' Environmental Leadership Workshops and Nature Trails

KIDS FOR TIGERS

Mumbai, Maharashtra

Supported by Anant Bajaj Paryavaran Mitra and Bajaj Electricals CSR

"The workshop was excellent, and extremely motivating. I loved being part of it," gushed Shweta Satavasa of the Dosti Foundation School. Sweta was not alone in providing us with positive feedback. Zufishan Farhan of Anjuman-i-Islam Girls English School said she plans more outdoor lessons to train and raise responsible future citizens. Niyati Shah of Raksha Children Education Centre added that the integrated approach was holistic and engaging.

A host of educationists from over 30 Mumbai schools gathered early on August 18, 2023 at the Bombay Natural History Society's (BNHS) Conservation Education Centre (CEC) abutting the Sanjay Gandhi National Park in Mumbai for a truly transformative, outdoor, educational event. Teachers are our unsung environmental heroes, and through its Kids for Tigers' initiative, Sanctuary has been kindling hope for the future generation by encouraging environmental stewardship, and empowering teachers to seamlessly instill ecological principles for the benefit of their wards.

SANCTUARY PHOTOLIBRARY

ABOVE *Nature Trails are popular with students and adults, and trails in Mumbai at the Maharashtra Nature Park and the BNHS' Conservation Education Centre saw an overwhelming response.*

The workshop was universal in that it focused on India, and linked biodiversity and climate issues across the globe. The audio-visual that was presented by Dr. Parvish Pandya, one of Mumbai's most popular nature educationists, and former Vice Principal, Bhavan's College, and Amandeep Kaur Bamrah, National Coordinator, Kids for Tigers, was identical to the one shared with teachers across India. Uniformly proactive, the gathering was encouraged to collaborate in smaller groups to formulate strategies for the seamless integration of environmental education into existing curricula. The ensuing discussions threw up innovative approaches, and helped Sanctuary strategise a national and global blueprint to prepare our children to adapt to a world whose climate had begun to wobble, largely because its biodiversity and ecosystems had been torn asunder.

It was a rainy day and teachers were guided through a rich forest trail, allowing them to explore first-hand the biodiversity of one of the world's finest urban forests. Of such practical experiences are nature and conservation actions born and internalised. With mud on their shoes, and a living forest to walk through, a tangible dimension was added to the workshop by way of firsthand encounters with wild nature.

By popular request and to accommodate a number of parents and children, a second nature trail was organised on August 18, 2023 at the iconic Maharashtra Nature Park. This time too the response was overwhelming. A total of 119 students, accompanied by

SANCTUARY PHOTOLIBRARY

ABOVE *A host of educationists from over 30 Mumbai schools participated in a truly transformative Teachers' Environmental Leadership Workshop on August 18, 2023 at the BNHS' Conservation Education Centre.*

43 parents and teachers turned up to explore the park, despite the heavy downpour on the day! The nature trail turned into a monsoon walk that offered all participants hands-on learning experiences in a natural setting crafted by turning one of Asia's largest landfills into a throbbing biodiversity lung at Mahim, Mumbai. Together with the experienced Sanctuary team, Dr. Parvish Pandya interacted with the large group sharing the park's history and its conservation importance to the city of Mumbai.

Marrying entertainment with education, yet another exciting Kids for Tigers nature education session was organised on September 8, for students playing an active role with Sanctuary's *'Save the Tiger'* initiative. Two very engaging sessions were organised: an Eco-Quiz and a Just-a-Minute (JAM) extempore interaction, where children spoke eloquently and passionately on topics such as 'Why do mangroves matter?' and 'The Role of Tigers in Ecosystems'. Narendra Muthe, Range Forest Officer of the Sanjay Gandhi National Park, was the chief guest and he helped youngsters explore the possibility of opting for careers in conservation.

After the event, yet another nature trail was conducted at the BNHS CEC, which was attended by students, educationists, and parents. A sign of the popularity of merging education and adventure was the presence of as many as 93 students, plus 15 teachers and parents from eight schools. Clearly both teachers and students are increasingly looking for meaningful, immersive experiences, and these will undoubtedly help to forge profound connections with nature. One unforgettable sighting on the trail was the discovery of a wolf snake, concealed snugly within the crevice between a door and its panel, feasting on a meal of lizard eggs. All participants returned wide-eyed with wonder and were fortified by a desire to learn about and protect India's vanishing wilds.

Bengaluru, Coimbatore, Delhi, Hyderabad, Nagpur and Panna

Supported by IndusInd Bank CSR

Most impactful environmental movements originate with a handful of people who were probably exposed to nature as children. So how do we create and nurture our future environmental leaders? By reaching out to and inspiring their teachers!

The Kids for Tigers annual Teachers' Environmental Leadership Workshop was held in **Hyderabad** at NASR Girls School, on August 23, 2023. The workshop sought to inspire teachers and equip them with a deeper grasp of environmental concepts, conservation principles, and sustainability practices. As with other cities where Sanctuary's Kids for Tigers Programme is active, we worked very closely with teachers to find ways to integrate nature learnings and imperatives into the existing school curricula. Our strategy? To stimulate curiosity and inspire children to fall in love with all things wild. The Hyderabad workshop was attended by 17 teachers with the dynamic B. Srinivas of the Indian Forest Service addressing teachers on the critical connection between environmental health and biodiversity protection. He emphasised the importance of wildlife conservation, detailing the evolution of wildlife protection legislation at both the Central and State levels.

SANCTUARY PHOTOLIBRARY

ABOVE *Nagpur educators attending the Teachers' Environmental Leadership Workshop are determined to incorporate its teachings by engaging with their students on wildlife and environmental issues.*

On August 26, the **Nagpur** Kids for Tigers' team held the Teachers' Environmental Leadership Workshop at the Seva Sadan Saksham School, Nagpur, which was attended by as many as 58 teachers from 27 registered Kids for Tigers' schools. In **Coimbatore**, the Manchester of South India, a similar workshop was conducted on September 16, at the Samskaara Academy, and on September 19th, **Delhi** teachers were treated to a thought-provoking workshop at Springdales School. A total of 30 teachers from 17 schools across the National Capital Region attended the session.

Following the workshops, held across India, teachers resolved to introduce more environmental learning into their school curricula. Hymavathi Ladhipally of Sanskrithi School in Hyderabad said that the workshop was a chance to instill a sense of responsibility for our natural world, fostering a deep connection between children and nature around them, adding that the interactive sessions and experience gained instilled confidence born of knowledge that would help teachers to make a real difference. Megha Gijare of TBRAN's Munde English Medium School, Nagpur, said she intends to incorporate the teachings of the workshop by engaging with students through group activities to help them understand the connection between saving India's biodiversity as a way to improve both health and happiness.

Kids for Tigers' reach extends to the oft-neglected smaller towns as well, with villages around the **Panna Tiger Reserve** being a new addition to the rapidly growing Kids for Tigers' family. Here a Teachers' Environmental Leadership Workshop was held on September 15 in the historic town of Khajuraho, in Madhya Pradesh. Clearly thirsty for such knowledge, a total of 36 teachers from as many schools participated in the workshop and requested Sanctuary to organise more such interactions, which they said would help their students to be a part of the larger national wildlife conservation mission.

The overwhelming response to these workshops across cities is a testament not only to the efforts being done by Sanctuary's Kids for Tigers' teams across the country, but also demonstrates that with the right exposure, people can and will reconnect with nature and thus possibly become its most staunch defenders.

TINY WONDERS

Once a city of 1,000 lakes that influenced its microclimate and replenished its groundwater, Bengaluru has seen a steady decline and degradation of its waterbodies. The few that have survived the relentless onslaught of 'development', are often visited by local naturalists and photographers to document the slivers of biodiversity on offer from an array of aquatic creatures and migratory birds to a host of insects, all evolved to maintain our biosphere.

The Kasavanahalli lake is one of my favourite haunts and it never fails to delight me. I have been particularly enamoured by macro photography, which opened up a whole new world that exists away from the gaze of most humans. It takes me beyond being a distant observer to one who feels part of the natural world.

On one of my many visits to the lake, I saw weaver ants *Oecophylla smaragdina* (*oikos* - house, *phyla* - leaf, *smaragdina* - emerald-like) marching a path up and down the trunk of a tree. These arboreal insects are so named for the ability to skillfully weave leaves together to craft intricate nests that pendulously hang from tree branches. Like master craftsmen, they weave leaves together using silk produced by their larvae. Talk about a family business!

The weaver ant genus *Oecophylla* is relatively old, and 15 fossil species have been found from the Eocene to Miocene deposits.

These arthropods, also called green ants (though they may be a range of colours, including brownish-red like these two!), are incredibly social, and form colonies with dozens of nests in a single tree. The queen first lays eggs on a leaf and carefully raises them to create the first generation of worker ants. The workers then construct the leaf nests and help raise future broods laid by the queen. They defend their territory vigorously, and can inflict painful bites when threatened. Watching these insects go about their business, working together as an act of 'one for all… all for one' survival is awe inspiring. Their strength is beyond impressive, with the ants capable of carrying impossibly large loads, often food, up to their nest.

I spotted these two ants, working together to carry what appeared to be the scale of another insect. Anticipating their path, I focused the lens on a spot where I expected them to cross and captured this image using a flash.

PHOTOGRAPHER: Anshuman Kumar
LOCATION: Bengaluru, Karnataka, India
DETAILS: Camera: Canon EOS 7D Mark II
Lens: Canon EF 100 mm. f 2.8L Macro IS USM, Aperture: f/10, Shutter speed: 1/100 sec., ISO: 160, Focal length: 100 mm.
DATE: September 1, 2020, 9:46 a.m.

ANSHUMAN KUMAR/SANCTUARY PHOTOLIBRARY

COURTESY NIRMALYA CHAKRABORTY

REST IN PEACE

ADITYA 'DICKY' SINGH OF RANTHAMBHORE

May 24, 1966 – September 6, 2023

By Bittu Sahgal

There are few people who knew the Ranthambhore of today better than Aditya 'Dicky' Singh. With something like 7,000 safaris under his belt over the last two decades, he was the 'go to' guy for anyone wanting to know almost anything about Ranthambhore and its tigers. What follows is an outpouring from the heart for the loss of my friend Dicky, a fierce warrior for our wilds who, when I asked, described himself as "*a photographer, wildlife enthusiast, conservationist, or traveller – you decide!*"

Ranthambhore has been home to my wife Madhu and our two daughters, Miel and Tara for decades. Instigated by Fateh Singh Rathore, *Sanctuary Asia*, the magazine you are currently reading, was conceived under the famous banyan tree at Jogi Mahal in 1981. Fateh was my inspiration, as he was for Aditya 'Dicky' Singh, who died far too young, too suddenly, too soon.

Without a shadow of doubt, Dicky was a lovable maverick. Virtually everyone in his family had served in the armed forces. He chose instead to join the Indian Civil Service, from which he quickly resigned, much to the consternation of parents, friends and most well-wishers. Then, with an engineering degree under his belt, he went into the construction business having graduated from Bengaluru's BMS College as a Civil Engineer. He made a bundle of money in a relatively short while, but that gave him no joy at all. His father prevailed upon his friend Fateh Singh Rathore, Field Director of the Ranthambhore Tiger Reserve to 'look after' Dicky who spent a full month in 1984, living as a personal guest of Fateh's, above Ranthambhore's famous Jogi Mahal gate. Within a few short years, Fateh wrapped Dicky up in tiger magic through Genghis, then Ranthambhore's most famous tiger. That was it! When he discovered that the young man was determined to live the rest of his life in Ranthambhore, Fateh eventually suggested, and Poonam Singh, now married to Dicky, readily agreed, that they would pour *all* they possessed into a home that metamorphosed in 1998 into the now iconic *Ranthambhore Bagh*, homestay.

Luckily for their guests, the *Bagh* was actually managed and run by Poonam, about whom Dicky (largely lacking in business sense) would repeatedly say to anyone who would listen: "I don't know what she saw in me... but all I know is I was damn lucky!" Not surprisingly,

by osmosis, Dicky's magnetism and Poonam's natural charisma and hospitality, led to their home becoming a magnet for some of the finest photographers and naturalists across India and the world.

To his last breath, Dicky rued the fact that, unlike Africa, Ranthambhore's tourism experiences had become sullied by investors more interested in cash than conservation. He rarely if ever engaged with those who accused him of being obsessed by tigers. But with his characteristic smile he would say as an aside, "I'm lucky to be obsessed by tigers, rather than the money that governs the lives of so many unhappy people!" This is also what motivated him and Poonam to acquire and rewild a relatively large parcel of marginal farmland in Bhadlav village (see box) which all manner of wild plant and animal species, including tigers have now occupied.

Typecast as a 'tiger guy', he would readily wade into brawls with those unable to differentiate between animal and species rights. Take the case of T-24, a magnificent tiger that had taken to killing people including guards, if he encountered them away from frequented motorable roads. When asked about his views here is how he responded:

> *A male tiger called T-24 killed at least four people and ate two of them over a period of a few years. The last victims were forest guards with years of experience. All four were attacked from the back, the way tigers kill prey. Post-mortems confirmed the killing was by neck-bites. Eye-witnesses saw the victims being dragged and eaten. The issue is now over, except that a magnificent tiger who, in my view, should have been allowed to die with dignity in the forest itself, was tranquillised multiple times for multiple reasons and eventually found himself incarcerated for life in a zoo.*

Over a decade ago, he explained how his and Poonam's occupation had given him the luxury of following particular tigers from birth to death. At that point he and Andy Rouse, one of his closest friends and his photography 'guru', were documenting the lives of Noor (T39), Krishna (T19) and Arrowhead (Krishna's female offspring) for a series of books they were planning. Long after most of the powerful people in whose hands the fate of forests such as Ranthambhore rests are forgotten, the likes of Aditya 'Dicky' Singh and Fateh Singh Rathore will be remembered as the true repositories of the wealth of India as represented by the wilds that gave rise to our great civilisation.

Extract from Rewilding India, One Parce of Land at a Time

Bhadlav, Rajasthan

Over two decades, Aditya 'Dicky' Singh and his wife Poonam Singh bought 35 acres of degraded land once owned by subsistence farmers, that flanked the national park, close to a village called Bhadlav. They fenced the property to protect it from wandering cattle, removed exotic and invasive flora, and allowed the land to restore itself to its original Aravalli landscape. Some well thought out landscaping interventions gave the land a chance to retain water for long periods of time. Today, the two watering holes in these forests are some of the last available sources of water for wildlife come the summer months. An aerial view of the property reveals an oasis of green, stark against the patches of brown, dry land surrounding it.

With the Ranthambhore Tiger Reserve as this private forest's 'seed bank', the land functions as an outward projection of this Protected Area, acting as a buffer zone between the national park just across their boundary wall and the farm holdings on the other side. Once the native flora came back, this forest has turned into a protective buffer zone for the reserve, often frequented by tigers, particularly during the summer season.

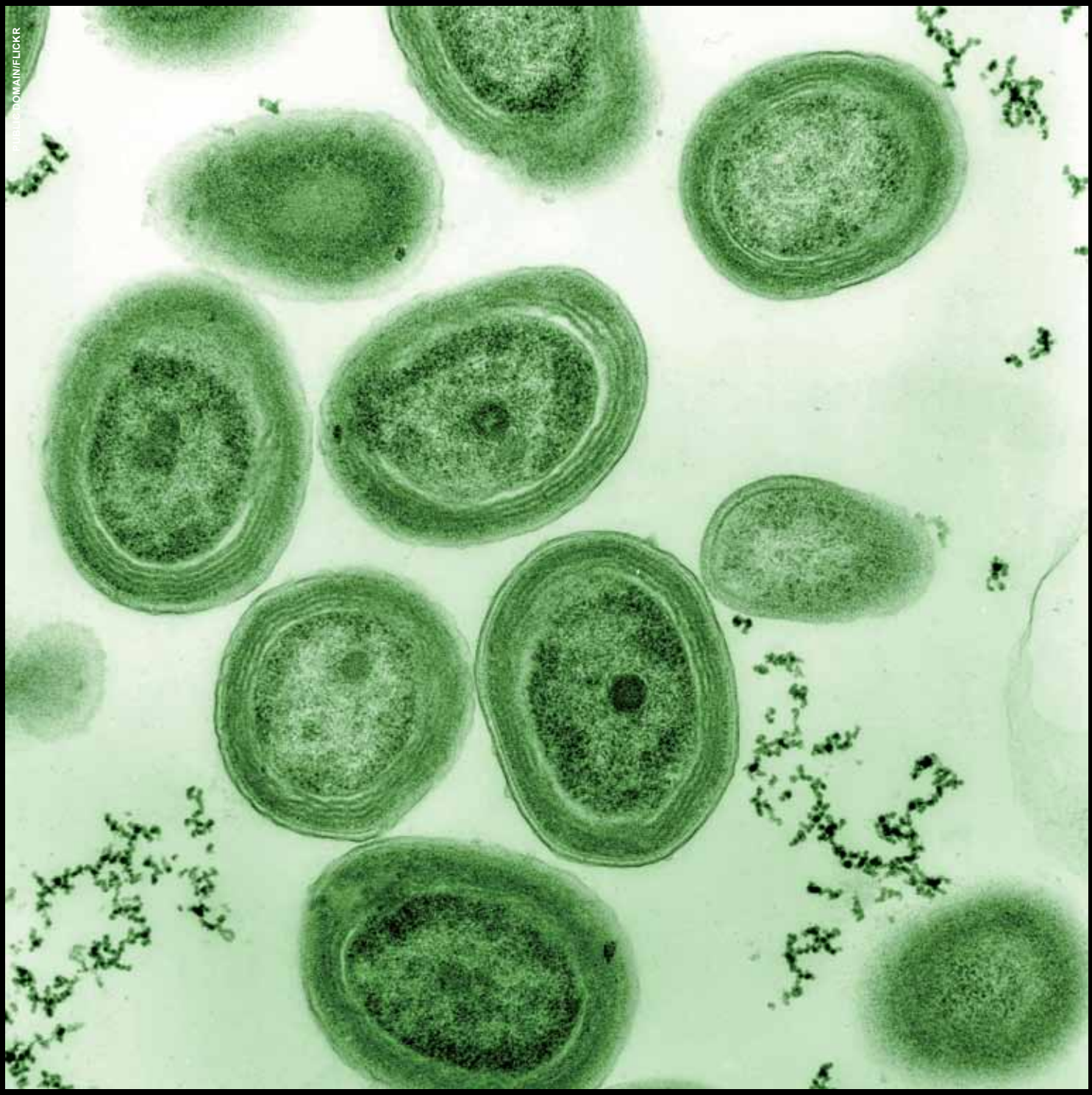
The mushrooming tourism economy in Ranthambhore presents a tremendous opportunity to develop pastoral and agricultural lands bordering the reserve in a sustainable manner such as that undertaken by the Singhs at their Bhadlav forest property. Besides tigers, leopards, nilgai, sambar, wild pig, small mammals and birds are also routinely found on site.

First published in *Sanctuary Asia*, Vol. 42 No. 10, October 2022

FACING PAGE *Aditya 'Dicky' Singh exemplified the magic of Ranthambhore and its tigers.*

BELOW *Aditya was a prolific wildlife photographer, who generously shared his images with Sanctuary. He won the Wildlife Photographer of the Year award in 2011 for his iconic image of a face-off between a tiger and a sloth bear.*

ADITYA SINGH/SANCTUARY PHOTOLIBRARY



PUBLIC DOMAIN/FLICKR

ALLIES IN THE WILD

You and I, we are made of stardust! Carbon, the building block of all lifeforms on the planet, is formed from the debris of supernovae, and is found in the sun and other stars; carbon is also at the heart of the climate crisis. As the world (or at least the conscientious fragment) races to capture different forms of carbon, to minimise further saturation of the carbon-choked atmosphere, it's just another day at the office for photosynthetic bacteria. Just like plants, these absorb and utilise carbon dioxide dissolved into the ocean from the atmosphere and release oxygen as a byproduct. They 'scrub' carbon from the atmosphere and add it to the food web, making the ocean a massive carbon sink. The miniscule photosynthetic bacterium is part of this mega carbon cycle that ensures carbon does not accumulate in the atmosphere.

The Sanctuary Papers

Text By Shatakshi Gawade

TWILIGHT WONDERS

The mesopelagic zone, which is also known by the more romantic-sounding name of 'The Twilight Zone', extends from 200 m. to 1,000 m. Despite the depth, however, some sunlight can still be detected here. The abundant mesopelagic fish that reside here, make up 95 per cent of all oceanic fish, weighing in at an astounding, estimated, 10 billion metric tonnes. These quirky little fish include lanternfish and blobfish, which live in the Arabian Sea, Mediterranean Sea and the north Atlantic. Their presence is much lower in the south Atlantic and polar seas.

Every night, in the safety of the dark, this colossal mass of fish migrate vertically to the surface where they eat photosynthetic bacteria, phytoplankton, and tiny plants, gathering up all the biomass – and thus carbon – near the surface. They then rush back to their depths to avoid daytime predators, transporting the carbon deeper within the ocean. This might well prove to be the largest daily migration of any lifeform on the planet! When these fish defecate or die and decompose, the carbon enters the deep ocean. This phenomenon is known as the 'biological pump'. Excretions from fish amount to 16 per cent of all the carbon – about 1.5 billion metric tonnes every year – that sinks into the ocean's top layers. All these processes, driven by mesopelagic fish are responsible for slowing global warming. Some studies estimate that without them, atmospheric CO_2 levels would probably be 50 per cent greater.

Disturbingly, mesopelagic fish are being looked upon as an 'unexploited resource', to feed farm animals and for human consumption. Disturbances to this population of fish could risk the smooth functioning of the marine carbon biological pump. The oceans in which these key marine organisms live are outside national jurisdictions. This endangers their survival in the absence of any binding treaties. Recently, COP15 vowed to protect 30 per cent of the oceans (and 30 per cent of land) by 2030 – we must work with the youth of the world to pressure their elders to fulfill the promises they so publicly make, yet routinely and irresponsibly renege on.

PUBLIC DOMAIN/RAWPIXEL

UNIQUE, AND THREATENED

COVID-19 demonstrated that a weakened immune system increases the chances of the viral infection turning fatal. The exact same logic applies to weakened ecosystems, and threatened species of the orders crocodilia (gharial, crocodile and alligators) and testudines (tortoises and turtles).

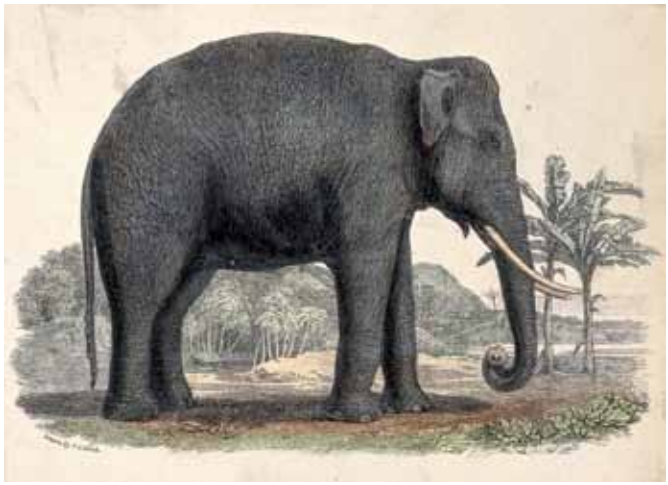
For an ecosystem to function, different animals and plants play specialized roles. This characteristic is known as functional diversity – the range of things an organism can do in an ecosystem or a community. Researchers found that for species of crocodilia and testudines that are already suffering at the hands of anthropogenic pressures such as pollution and habitat degradation, the loss of functional diversity is higher than it would have been in un-pressured circumstances. When compared with any other threat, the loss of habitat could *double* the loss of functional diversity. The study also found that if all 'Critically Endangered' species were to go extinct, 13 per cent of "unique life strategies would be lost" (a life strategy is how a creature uses its energy and available resources between growth, reproduction and survival). Further, if a species has unique life strategies (such as parental care among gharial by fathers), pollution, disease and local consumption would take a greater toll of them. They also found that species that have higher reproductive outputs, such as clutch sizes, were more susceptible to pollution.

The higher threat to survival among crocodiles, tortoises and turtles is a danger to other species and the ecosystem, since these reptiles often influence the health of ecosystems by keeping prey populations in check, and by digging burrows which other animals use. In short, there is an urgent need to conserve and protect crocodilian and testudine species, for the wellbeing of entire ecosystems. The researchers also suggest incorporating functional diversity into conservation strategies so that local stakeholders can take customised actions.

PUBLIC DOMAIN

Did You Know?

By 1995, non-native species had decimated the population of Antiguan racers Alsophis antiguae, *endemic to the twin-island country of Antigua and Barbuda, to an alarming level of a mere 50 individuals remaining on just one islet. Mongoose, which were introduced to control rats, feasted on these snakes and their prey (lizards). Once the alien species was cleared, the snake population bounced back, and there are now 1,100 Antiguan racers at four sites!*



PUBLIC DOMAIN/RAWPIXEL

STOMPING LIFE INTO LAND

In the context of rewilding, that moment of deep diving into the Earth isn't surprising any more! Elephants are keystone species and ecosystem engineers, shaping and maintaining habitats as they serenely pass through the forest or savannah. Their passage creates pathways for other animals and offers more space for new vegetation to flourish. In savannah grasslands, elephants, for instance, knock down trees, thus maintaining the grassland ecosystem. Even an elephant footprint can become a microhabitat – when the depression in the ground fills with water, it becomes a home for tadpoles and other organisms! Elephants also disperse seeds and actively cycle nutrients. As elephant populations continue to decline, it is vital to tackle threats to this species from global trade, and habitat loss. Researchers in Denmark even proposed that Asian elephants should be introduced near Copenhagen to bring back the benefits associated with megaherbivores! In Australia, some researchers suggested bringing elephants and rhinos to help control wildfires, as was observed in the Serengeti after the successful population restoration of the wildebeest. (This would be hopelessly ill advised!)

As crucial as elephants are, a study found that some smaller animals such as gazelles and impalas prefer elephant- (and giraffe-) free habitats. The complexity of such unintended consequences of restoring and reintroducing species must be kept in mind, since existing species may also be threatened with endangerment.

PUBLIC DOMAIN/BIODIVERSITY HERITAGE LIBRARY

THE MANY FACES OF *PROSOPIS*

The *Prosopis* genus has species that are xerophytes – they can thrive in desert environments. But the *baavlia* tree ('the mad one', in the Marwari language) *Prosopis juliflora* was never meant to be in Rajasthan, or in the United Arab Emirates (UAE), where its consumption of groundwater has increased by a staggering 7,372 per cent between the years 1990 and 2019. As in the UAE, *P. juliflora*, a Mexican shrub, was introduced to 'green' the desert of western India. Since the colonial British introduced the plant in a bid to increase availability of firewood, the rampantly invasive, thorny plant had spread to over half a million hectares by the start of the 21st Century across India's arid zones. It also proved to be a menace in Gujarat, where it eliminated Asia's largest grasslands. In Delhi, it occupied over 90 per cent of the Delhi ridge forest. While creating the Rao Jodha Desert Rock Park in Jodhpur, Pradip Krishen, the park's architect and author of *Trees of Delhi*, had to use herbicides, compressor-driven tools, even dynamite, and finally the skills of local sandstone miners to eradicate the stubborn *baavlia* from the rocky land before he could rewild the park with native species.

On the other hand, there is a *Prosopis* species that made environmental history – the *khejri* tree *Prosopis cineraria*, which is a lifeline for the local community. In 1730 CE, 363 *Bishnois* led by Amrita Devi and her daughters were killed by the king's men for refusing to let the trees be cut. Even today, this moderately sized, thorny evergreen tree plays a major role in the rural economy of Rajasthan, and is, not surprisingly, considered sacred. The slender pods of the tree are used to make local delicacies such as *ker sangri*, the leaves are used to feed cattle, and the wood is used for furniture. Some documentation reports that the wood was used to make flour during a famine in 1869. The tree also provides shelter, nourishment and hydration to wildlife. The hardy *khejri* tree, also known as the 'tree of life', is perfect for the desert climate, and essential to the ecosystem.

Did You Know?

As the male Eurasian Bittern Botaurus stellaris*, a thickset heron, steps cautiously through the reeds by the water in wetlands, he emits a deep, far-carrying boom, which sounds a lot like a computer glitch! The planet almost lost this bird in the late 19th Century, following hunting and draining of wetlands, causing the extinction of breeding bitterns in the wild in the U.K. Alarm bells were set off, and efforts made to restore wetlands by expanding reedbed networks and pools. The secretive bird's population is gradually recovering in the U.K. thanks to concerted conservation and management projects.*

A COMMUNITY OF COASTAL PROTECTORS

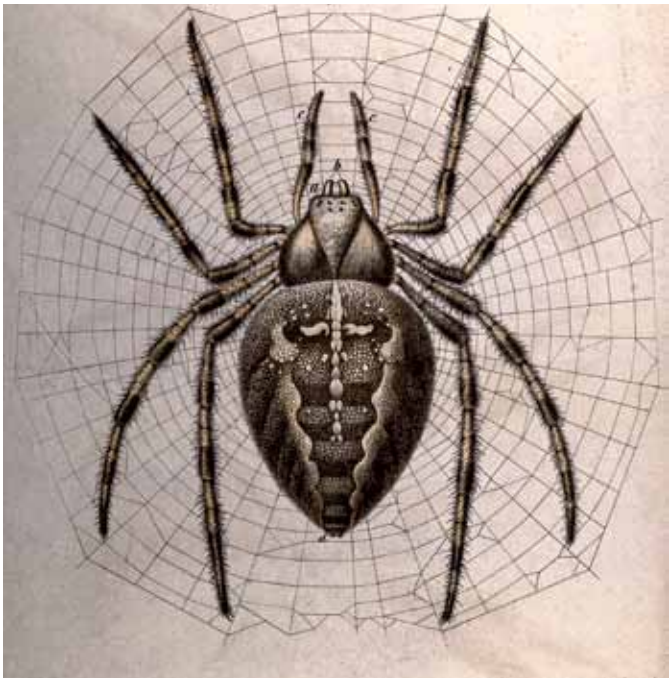
PUBLIC DOMAIN

Did you know that an oyster also has a tiny, beating heart? It does not, however, have either a head or a central nervous system, so if you are one of those that swallow it whole with a dash of lime, it may feel hurt that you're eating it, but it may not feel the pain.

The oyster never lives alone, it prefers company. This two-shelled mollusc grows in large clusters on the sea bed. When the salinity and temperature are perfect, the male oyster releases millions of sperm into the ocean, which sets off other males in the vicinity. The females too play their part immaculately – they release bursts of eggs into the sperm-laden water. Incredibly, these floating sperms and eggs come together to form larvae, which begin their life by floating gently with the tide. In an act of community formation, the larvae eventually attach themselves to another oyster on the bed, sometimes miles from where its parents emitted it, to add to a vast structure known as an oyster reef.

Oysters are of great importance to the ecosystem. They filter coastal waters. When the bivalves suck in water, they pull in nutrient-rich organic matter and release filtered water back into the ocean, thus preventing an excess of nutrients from triggering an algal bloom, which would have consumed oxygen and made the waters uninhabitable for marine life. An individual oyster can clean up to five litres of water per hour, removing organic and inorganic toxins and preventing a disruption of the ecosystem. Oyster reefs provide a habitat for skilletfish, toadfish, and blue crabs. Up on land, oyster reefs reduce natural and climate change-induced coastal erosion and flooding. Though oysters have been harvested for thousands of years as food and help maintain healthy fish populations, they had lost about 85 per cent of their historic extent globally by 2012. This was the result of development-related erosion, decline in water quality, wetland loss, and unsustainable harvesting. And so, predictably, oyster reef restoration has been taken up on a large scale to ensure that their ecosystem services can be sustained. One of the methods to restore oyster reefs involves laying out shells and rocks for them to grow on, in the hope that new oyster reefs establish themselves. So... the next time you pick up a shell from the beach, think twice!

THE SPIDER EFFECT



PUBLIC DOMAIN/ ARGONNATIONAL LABORATORY

Introducing and protecting predator species might seem like a death sentence for prey species. But nature wouldn't kill the golden goose, so to speak – predators would obviously go extinct without prey.

But guess what? How a species of predator finds its prey can influence not just the prey population but also how much carbon is stored in the ecosystem!

Some spiders weave a web and wait for the prey to walk into it, while other spiders actively go hunting for food. Researchers found that when a sit-and-wait spider species was the dominant hunter, grasshoppers (the prey) chose carbon-rich grasses to give them energy for the increased number of encounters with their predators. Conversely, when an active spider such as a peacock spider or jumping spider was the dominant predator, there were fewer encounters between grasshoppers and the arachnids.

This made the grasshoppers choose grasses with less carbon content, letting carbon-rich species thrive, inadvertently increasing the carbon storage capacity of the grassland. The researchers estimated that there is a difference of 41 per cent of soil carbon between the two scenarios.

Did You Know?

Beavers are marvellous engineers – when they build log dams across streams, they enable the creation of wetlands as the water builds up. The dam not only creates a 'beaver lodge' for them to live in, but it also shapes habitats for both aquatic and terrestrial plants and animals such as salmon and mule deer. The retention of water also helps make the landscape more resilient to drought and fire. They also help enhance carbon sequestration in boreal and temperate forests, as organic matter sinks in the pools.

THE REWILDERS

Not an option… a survival imperative

By Shatakshi Gawade

Fueled
by a million man-made wings of fire – the rocket tore a tunnel through the sky – and everybody cheered.
Fueled
only by a thought from God – the seedling urged its way through the thicknesses of black – and as it pierced the heavy ceiling of the soil – and launched itself up into outer space – no one even clapped.

– Marcie Han

APOCALYPTIC TIMES Well, that's how simple the creation of life is – a coming together of elements in just the right proportions and conditions, and a new life bursts forth nonchalantly. It is the culmination of steady evolution from microorganisms that began 3.7 billion years ago; whether you believe in god or Nature as god, there's no denying the magic and resilience of life on Earth. This resilience, however, is being challenged repeatedly – we have crossed six of the nine planetary boundaries in 2023, increasing the risk of "large-scale abrupt or irreversible environmental changes". Researchers have now concluded that we have pushed our planet Earth far outside safe operating conditions for humanity.

Business as usual is just not going to cut it – the Intergovernmental Panel on Climate Change had warned in its first assessment report in 1990 that the global mean temperature would rise by 4°C above pre-industrial levels by the end of this century, and global mean sea level would rise by about six centimetres every decade, in a business as usual scenario. Thankfully, the science never fell on deaf ears, and by 2010, the rate of growth of greenhouse gas emissions did actually slow. But we STILL need our GHG emissions to peak in the next two years at the latest, and reduce them by 43 per cent by 2030. The good news is this is eminently doable, without compromising on basic human needs – the one that will primarily benefit from climate despair are the likes of fossil fuel companies profiting from our inaction. And politicians seeking instant vote bank bonanzas.

WHAT NOW? From the top to bottom, we need real action to curb and absorb GHG emissions. But no, we aren't just talking about reducing the use of fossil fuels, or air conditioners! We are taking a step back to where we came from. The Wild.

Rewilding is the process of ecological restoration of ecosystems to reverse biodiversity loss, by letting natural processes reclaim land and sea. Rewilding can help address the climate crisis as well as prevent mass extinctions, while giving local economies a chance to develop. And here's a reason why humans must be bothered about rewilding – healthy ecosystems ensure ecosystem services such as clean water and air, pollination services, nutritious food, regulation of zoonotic disease, and soil formation. These ecosystem services – which are not accounted for in extractive economic indices such as GDP – are crucial for our continued health and survival. While technological quick-fixes in some nebulous future are seen as our last hope, the fact is that we can halt and reverse climate change without a 'silver bullet' – just as long as we are prepared to change, and let nature fix itself.

If we just let it take its course, you would be astonished at how quickly nature bounces back.

ME? I CAN DO SOMETHING TOO? Estimates suggest that the urban population is going to double by 2050. This would mean more built spaces, which need a dash of native greens.

Gardens and community spaces should include plants that are suitable for and adapted to the local weather, soil and existing biodiversity. These will increase pollinating insects, hold soil and clean water if they are in the ground, and give birds and other local animals food and shelter.

Landscaping can also include rewilding principles by allowing the land to rejuvenate through 'benign neglect' or 'minimal interference' – letting different species of fauna take their own time to establish and grow, and only intervening to gently add resources such as trenches. A critical aspect in rewilding is the nuisance created by invasive species.

Here is some light reading you can indulge in to explore rewilding: *A Guide to Rewilding, Rewilding: India's Experiments in Saving Nature,* and *Rewilding the Urban Soul.*

ABOVE *Local school children planting seedlings. Collaboration and cooperation is key to the success of all rewilding initiatives.*

THE NATION Rewilding is required at a much greater scale, in addition to individual efforts. According to the Forest Survey report of 2021, 24.62 per cent of the geographical area of India is under forest and tree cover. While this number in itself doesn't give a clear picture of how much of this is native, how much is wild, and how much biodiversity it actually supports, the country anyway has far to go to reach the target of 33 per cent forest cover as identified by the National Forest Policy. However, there is much more to the wild than just trees, and preserving and restoring crucial ecosystems such as wetlands and Open Natural Ecosystems (ONEs), which include grasslands, scrub, and marsh areas, is an important step that requires citizens and governments to act together.

Many laws and programmes in the country have so far ensured a degree of protection for our biodiversity in different ecosystems. For instance, Project Tiger has created a political, public and bureaucratic system which protects the tiger from poaching. Collaterally, its habitat and thus other species are also protected. The expansion of the Protected Area network under Project Tiger has helped return some spaces to a healthier status.

But hang on, all's not well in the subcontinent. The dilution of certain laws has increased the threat of anthropogenic pressures on India's biodiversity. The *Forest (Conservation) Amendment Act*, 2023 leaves out many land parcels from protection, such as areas within 100 km. from the border, and any area that is not defined as a forest under the *Indian Forest Act*, 1927 even though it may be a forest by the dictionary meaning.

Continuous citizen involvement is crucial to protect existing environmental laws. Every time the government puts together a draft legislation, it asks for feedback. As concerned citizens, it is our duty to send in letters with our point-by-point comments. Petition organisations and NGOs often put up points to send to the concerned ministry. Watch out for these pieces of legislation and respond with strongly worded letters. These must raise the demand to include rewilding principles in management practices, and increase funding for rewilding.

Sometimes, Indigenous people and other local communities have to pay the price for living in the lap of nature twice over – once, through the tussle for survival with wildlife as they get into farms or encounters that become attacks; and second, when they face the extreme vagaries of nature induced by climate change and habitat degradation. Policy interventions must ensure rights of local communities. Besides, the participation of the local community in conservation efforts is key to the success of programmes – they often have intimate knowledge of the ecosystem, they are physically present in the vicinity for continued work and emergencies, and they can benefit financially as well as in terms of a healthy living environment.

ACROSS THE CONTINENTS Internationally, there are various plans and policies in place to move us towards a healthier ecosystem. For instance, we are currently in the UN Decade on Ecosystem Restoration, the '30x30' conservation target of the Global Biodiversity Framework calls for conservation of 30 per cent of land and 30 per cent of sea by 2030, and older global agreements such as the Ramsar Convention are helping us move towards the goal of rewilding.

Some of the programmes are fascinating examples of what can be implemented on a larger scale. India particularly needs to do this. Earlier this year, eight island-ocean ecosystems were selected to be rewilded from ridge-to-reef, by Re:wild, Island Conservation, UC San Diego's Scripps Institution of Oceanography, and other partners, with a focus on complete restoration that will benefit the oceans, wildlife, and the community. This will involve removing invasive species and reintroducing native species, habitat restoration, and protection of both land and marine ecosystems in 40 islands by 2023. In eastern Europe on the Danube river, the reintroduction of water buffalo in their historical ecosystem created new habitats for fish, amphibians and other species, and the Danube delta began throbbing with life. In the Patagonia National Park, Chile, 700 km. of fencing was pulled down to allow herds of guanaco, puma and other wildlife to return to the land, while keeping livestock out. This helped vegetation to flourish even in overgrazed ranches. If you'd like to see more such awe-inspiring rewilding examples, check out this interactive map of projects across the world, created by OpenForests together with the Global Rewilding Alliance.

Collaboration and cooperation is key to the success of all rewilding initiatives. Finances, physically executing projects, research and resource mobilisation, become possible through partnerships between local communities, governments and all manner of organisations.

Rewilding projects need trans-boundary cooperation, exchange of knowledge and resources and the best practices and technologies designed to tackle global conservation challenges. The engagement of local stakeholders and committed organisations can enable long-term projects, since rewilding takes several years, sometimes decades, to come to fruition.

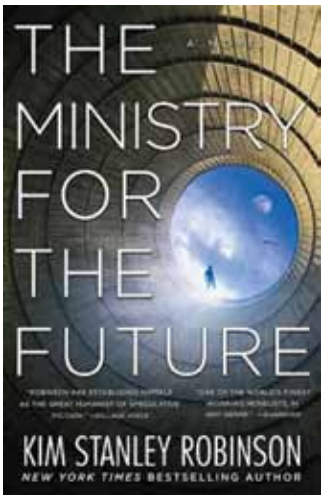
EMBRACING THE WILD We really can Rewild at every level, from our backyards to our global commons. How fast we act, the conviction with which we take the next steps, and a combination of a scientific approach and traditional knowledge, will all shape the future of life on the planet.

What You Can Do

1. Write to the Heads of States attending COP 28 at Dubai by November 15, 2023 to draw their attention to the imperative of Rewilding to counter climate change. Refer to the 12 guiding principles of rewilding outlined in the Global Charter for Rewilding the Earth, include points and examples from this issue, and ask that Rewilding principles be included in all new, or changed legislation. Also mention the problems that dilution of environmental legislations will create for ecological restoration and climate change action, and hold your national leaders to promises made at international fora where they pledged carbon emission reductions after tortuous negotiations, which many nations are now going back on.
2. India has been on a plantation spree (see page 24) over the last few years. Visit such plantations in your locality with a botanist to analyse the tree species – are they natives, are they native to the land? Write about your explorations to us at editorial@sanctuaryasia.com.
3. Organise or participate in drives to remove invasive plants from plots where you plan to rewild or where native species are struggling to survive. Also read about how megaherbivores keep invasive plants at bay (see page 9).
4. Every time governments announce legislation that will dilute environmental protection or prevent rewilding initiatives, post about it actively on social media, and urge your networks to do so as well, while tagging all the concerned ministers and officials.
5. Experiment with Rewilding your garden, a community open space, or agricultural plots! Successful 'petridish' experiments will firm your resolve.

BOOK REVIEWS

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



THE MINISTRY FOR THE FUTURE

By Kim Stanley Robinson
Published by Orbit Books
Paperback, 592 pages, ₹ 699

There is something deeply unsettling reading about the end of the world as you know it. *The Ministry for the Future* begins in a familiar, if unusual, setting for most of us – a small, unnamed town in Uttar Pradesh, a few years in the future. There, a young doctor named Frank May works at a small clinic. As the day goes on, temperatures rise – the town, the region, is in the grip of a massive heatwave. Eventually, temperatures reach deadly heights, and electricity is cut off across the Gangetic belt. Wet bulb temperatures rise to over 42°C – well beyond the physiological limits of the human body.

Twenty million people die in India within a week. This heatwave sets off a chain of events across the world and over the following few decades, that unfold over the next 100 chapters. Only a little while before, the eponymous Ministry for the Future was formed, headquartered in Zurich. The Ministry is an international organisation formed to work with various governments and organisations, such as the Intergovernmental Panel on Climate Change (IPCC) and signatories to the Paris Agreement, to "advocate for the world's future generations of citizens".

Drastic changes take place, with some communities buckling down and refusing to acknowledge the climate crisis, while in other places, such as in India, a new government is voted on across caste, class and religious lines to focus on environmental and climate issues. The book goes on to describe the evolution of a new, egalitarian society in India, after this unimaginable tragedy. *The Ministry for the Future* is the only science fiction book I've read that speaks of caste injustice in India, and imagines a future in which Indian society is fully integrated.

The book switches between alternating points of view, from climate refugees, to members of an extremist environmentalist group assassinating those behind the climate crisis, to the head of the Ministry for the Future, to scientists trying to stop the Antarctic from thawing completely. Some of these stories even converge. Most of the characters remain unnamed, and the first-person perspective of their stories puts the reader squarely in their boots, living through the horrors they are suffering.

The style of the book is unique, alternating between first-person accounts, third-person reports, meeting notes, Socratic debates, and other philosophical interludes on topics such as cognitive bias, which may seem rambling at times, but then it will come to a point so sharp you wince. *The Ministry for the Future* is not just about climate change, but also its causes, primarily inequality. The book discusses and eloquently explains important real-world concepts such as the Gini Coefficient, and Inequality-adjusted Human Development Index. There is ample acknowledgement that climate change is genocide of the weakest and poorest sections of society, hastened by inequality and permitted by the blinkers of a capitalist economic system.

However, the book also details how individuals and communities, and the Ministry for the Future, come together to fight for a brighter future, from reimagining an economic system that can be more equitable, to creating carbon-negative cities, and pushing for and introducing legislation to protect future generations. Dystopias are a dime a dozen in science fiction. Well-written books that speak of how people come together to avert the dystopia? Those aren't so common. My hope is that such things will not remain merely in the realm of science fiction, but one day become reality.

Reviewed by Bhavya Iyer.

BLACK-NECKED CRANE: GENERAL BIOLOGY, HABITAT, MIGRATION & CONSERVATION

By Pankaj Chandan and Asad Rafi Rahmani
Photo editor: Dhritiman Mukherjee
Published by WWF-India, 2023
Hardcover, 198 pages, ₹1,695

Though the Internet is a ready repository of material from all over the world, books such as Dr. Chandan and Dr. Rahmani's 200-page coffee table monograph on the Black-necked Crane play an indispensable role in presenting a consolidation of species information, that too in easy-to-understand language accompanied by apt photographs.

The book is conveniently and lucidly structured into chapters such as breeding biology, wintering ecology, food, migration, threats, conservation and management, and more.

The authors dive deep into the life history of the Black-necked Crane (BNC) *Grus nigricollis*, the last crane species to be discovered on account of its preferred high altitude wetland habitat. The authors elaborate on the bird's movements, eating habits, behaviour including parenting and other biodiversity in its habitat, based on the authors' own long-term data as well as relevant research. The authors' documentation is minute, which is indispensable in any management strategies to protect the bird.

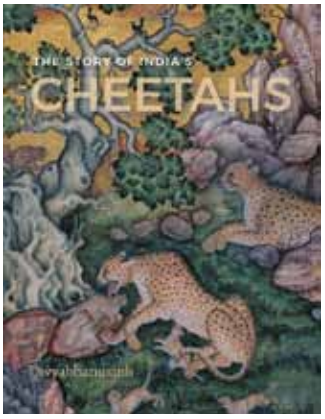
The book traverses across countries that are part of the crane's range. Nature truly should be without borders, so understanding the bird and the politics that affect it across its habitats is vital. In this context, the authors note that the BNC can be an excellent symbol of conservation and cooperation among nations that will help protect wetlands, grasslands, and the flyways used by them during their migration. Cranes are intricately connected to many cultures and considered sacred in many. They are a symbol of the everlasting bond between nature and people.

Each page is lit up by lovely images of birds, breathtaking landscapes, and other wildlife and communities that share their habitat. The descriptions are also aptly represented in maps, tables and graphs, making it a perfect coffee table book. Capturing wildlife in action in every aspect from breeding, feeding, even migrating over vast mountain ranges, to threats such as free-ranging dogs feeding on eggs as the bird watches, is a true feat of technology, the photographer's presence of mind, patience, and an understanding of the BNC's behaviour. The contributing photographers and photo editor of the book deserve a special mention for putting together a spectacular selection.

The anecdotes in little boxes throughout the book pull you into the BNC's landscape, as though you were standing right there. The book will be useful for researchers, naturalists, students, officials in the government, and even the layman visiting the BNC's terrain. For anyone considering conservation (or developmental) projects in this landscape, this book is a valuable tool since it identifies different aspects of the ecosystem in relation to the BNC.

I hope, when I visit Ladakh, I can also hear the Black-necked Cranes call in unison, reverberating across the valley, or better still, see these magnificent winged creatures as they raise their crimson-tipped heads to the heavens.

Reviewed by Shatakshi Gawade.



THE STORY OF INDIA'S CHEETAHS

By Divyabhanusinh
Published by Jyotsna Nambiar
Hardcover, 322 pages,
₹ 2800

The cheetah has recaptured our attention in the past year, when India undertook the ambitious project of introducing the species! The outcome of the project notwithstanding, I was definitely curious about the life (and disappearance) of the feline in India. And Divyabhanusinh's book could not have come at a more opportune moment. The book travels through time as the author unveils the life of the cheetah in India from 2300 BCE, as portrayed in jagged prehistoric paintings in cave shelters, to travelling on carts for hunting expeditions, and to being reduced to skins as the result of *shikar*.

About 30 years ago, in 1995, Divyabhanusinh, a conservationist who has championed disappearing wild species, authored *The End of a Trail: The Cheetah in India*, an exhaustive book about the species in the country. *The Story of India's Cheetahs* is a revision and update of the text of his first work, to include the cheetah introduction programme. Divyabhanusinh, a close associate of *Sanctuary Asia*, has been the President of WWF-India, and a member of different national and international bodies for wildlife, such as the IUCN's Cat Specialist Group. He was also a part of the Cheetah Task Force when it was constituted by then Environment Minister, Jairam Ramesh, when the reintroduction of the cheetah was discussed in 2009.

The book delves deep into the life of cheetahs in different geographies, cultures, languages and texts across different periods in India. This is a book for wildlife as well as history buffs.

Along with the text, the book is studded with plates of cheetahs represented in fine art miniatures painted during the reign of the Mughals. A particularly impressive recreation in the book is one of a painting dating back to 1570, attributed to Indian miniature painter Basāwan. This depicts a cheetah family, with two adult felines and four cubs, in a rocky landscape under a towering tree. This is said to be the earliest record of the cheetah in the wild in India. The Mughal Emperor Akbar is known to have kept 1,000 cheetahs in his stable, and is believed to have possessed as many as 9,000 over the five decades of his rule.

The section on British rule in India is the proverbial smoking gun, detailing the lengths to which they went to enjoy a 'pastime' they could not find at home. The author also notes the explosion in documentation of the cheetahs, from numerous accounts of *shikar* to art and naturalists' observations. Several cheetahs were also shipped to Britain. Additionally, the author painstakingly records the last few sightings of the cheetah in India. And when was the very last of these wild cats spotted in our country? Read the book to find out!

The extensive records of *shikar* help understand the historical range of the cheetah, its prey, its hunting style, its interactions with humans and other animals. The Mughal practice of trapping and training cheetahs for hunts has generated a wealth of information on the cat. An entire chapter is dedicated to such manuals, which also include illustrations, highlighting the relationship between people and cheetahs. The author ruefully points out that modern Indian zoos seem to have learnt nothing from the old management traditions.

The author dismisses other theories about the cheetah, including the one that all cheetahs in India were brought from Africa, with documentation from across the centuries.

After presenting historical evidence in relation to humans, the author leaps into the biology of the cheetah and its lineage. Employing genome analysis, studies of skulls and skins, and other techniques, he highlights how closely related different cheetahs are to establish whether African cheetahs could/should be introduced in India.

In the last chapter, the author discusses the rationale and prospect of introducing cheetahs in India. Since the 1950s, when the administration realised that the cheetah was in danger, discussions on initially preserving and then, by the 1970s, introducing cheetahs have been ongoing. The current programme of cheetah introduction moved forward in fits and starts from 2009, with many twists and turns in the form of court orders, and several stakeholders. The book goes on to explain just how it came to fruition, including the controversy surrounding it.

One overarching point made by the National Tiger Conservation Authority presented by the author is that the reintroduction/restoration of a flagship species (such as the cheetah) is an ecosystem restoration programme in much the same way as the protection of the one-horned rhino ensured the survival of Kaziranga's grasslands, or the way the protection of the Asiatic lion helped protect the scrub grasslands of Gir.

Reviewed by Shatakshi Gawade.

NETWORKING

Join *Sanctuary's* online network

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

@sanctuaryasiapage
@sanctuaryasiagroup

@SanctuaryAsia
@SanctuaryAsia

On Sanctuary August Cover

Tiasa Adhya #fishingcat – Cover Story and Cover Page... The new *Sanctuary Asia* issue is all decked up for you.

On Sanctuary August Phytofocus

taniku.kun I love how you call these plants without a home the 'botanical dispossessed'!

inspiredbywilderness It is also called 'devil's trumpet' because of its toxicity. It can be seen growing wildly in some parts of Western Ghats as well.

Aparajita_datta Your articles are really special. Saw lots of these in Colombia. The nectar of the flowers is important for several hummingbird species.

On The Pendulum of Life

drnicolasrao Great photo and text. I enjoyed both the visuals and the information.

vishal_wildlife Fantastic documentation!

On Sanctuary August Photofeature the black microhylid frog

doggedplod Women want him. Men want to be him. Bugs are sceptical.

RENJITH HADLEE

On past Sanctuary Wildlife Photography Awards images

basava29 Every photo tells a great story. These are truly moving images.

Amit Daw Always sad seeing an animal going through garbage left by humans.

Khanasif36 Beautiful, especially the skimmers, unfortunately a species under constant threat.

Malaika Shah I can't wait to see the pictures from this year! It's going to be amazing!

leanbeefprithvi Looking forward to seeing the pics submitted this year!

On the mega port proposed near #Pulicat

Pooja Maity I'm sorry for being so negative but at least I am convinced, nothing can be done. The government will ruin everything because they have the power to do so.

On the 'Call of the Wild' collaboration with The Plated Project and Dia Mirza

Itssoaditi Everything looks amazing! I'm so happy to see this unfolding.

Mariagorettiz It's beautiful!

On Sanctuary's 'In Our Filth' campaign

Flying_squirrel_holidays Plastic bans are not a substitute for an effective solid waste management plan. Just saying 'no plastic' does not fix the underlying issue.

jainaturalist Shameful act by the 'educated' animals.

PADMANAVA SANTRA

READERS' FORUM

On Sanctuary August 2023 Phytofocus

This is so surreal and beautiful! I agree that we should have managed populations of different species around the world in case disaster strikes their native land.

Katia Hougaard, London, U.K.

Brugmansia is a regular in gardens in and around Coorg and other parts of Karnataka. Friends have sent photos from Maharashtra as well! Seems like it has found a good place in India!

Sayee Girdhari, Mumbai

I have seen a similar species (same flower, with a yellow colour) in tribal home gardens of Paderu and surrounding regions in Andhra Pradesh. I am not sure if they were brought there or if they are native, as I haven't seen them in other non-tribal areas of that region.

truthblissconsciousness

SOHAM KACKER

ANDY ROUSE

On the passing of Aditya 'Dicky' Singh

Dicky exemplified the magic of Ranthambhore and its tigers. He was our family. Always will be. Always!

Bittu Sahgal, Mumbai

A little bit of Ranthambhore has been lost with his passing.

Zhayynn James, Chennai

Reading through the article in Sanctuary just reinstated and exemplified all that's been said about him. A sad loss for Indian wildlife, especially the tigers of Ranthambhore. His work will never be forgotten.

Arushi Kanwar, Gurgaon

For those who met him, Ranthambhore will feel very empty in many ways from here on.

Rahul Sachdev, Mumbai

IN OUR NEXT ISSUE...

The Sanctuary Wildlife Awards 2023

The Sanctuary Wildlife Photography Awards now include fresh new categories and prizes. Enjoy the stunning entries from this year. Also meet the inspiring Sanctuary Wildlife Service Awardees, selected from the length and breadth of India.

Revisiting the Western Ghats

Over two months, this monsoon, **Saurabh Sawant** rekindled adventures of the past, accompanied by old friends and naturalists for birding and herping. In this delightful photo essay, he shares some of his most treasured sightings, all of which he says herald even more adventures in the future.

ANIRBAN DUTTA/ WILDLIFE PHOTOGRAPHER OF THE YEAR 2022

He was a friend of many years and a great storyteller. He loved being in the forest and being the evangelist for wild India. His presence will be sorely missed, and I am confident that his wife Poonam and daughter Nyra will keep the flame alive. What a place to have your soul roam free, in the forest, with the tigers of Ranthambhore.

Paul Abraham, ***Mumbai***

On Loving Birds in the Midst of a Pandemic

I appreciate Shubhobroto Ghosh's article wherein he has highlighted our *Birds of India* book. I am happy that he has done this in one of the best wildlife magazines the country has today.

Gopinathan Maheswaran, Kolkata

MUKUL MUKHERJEE

Jharkhand Memories

I recently stumbled upon some incredible photographs that took me back to my days as a Wildlife Consultant in the breathtaking Palamau Tiger Reserve. As I was writing an article, these never-before-seen images surfaced. They capture the untamed beauty and unique wildlife moments I was fortunate to witness during my time working alongside the dedicated team at the Wildlife Division of Jharkhand. What makes these photos even more special is the advanced technology behind them. I used DSLR Trap Camera Photography, powered by the TukaBots sensor, combined with my trusty Nikon D750 and a 16-35 mm. lens. This sophisticated setup allowed me to capture the essence of wildlife in its purest form, without causing disturbance to these incredible creatures. I can't wait to delve deeper into these images and share more about the incredible stories they hold.

Mukul Mukherjee, ***Bokaro Steel City***

Errata

The August 2023 cover image was part of the project executed by the Uttar Pradesh Government in the Dudhwa National Park in 2016. Team members included Abhilasha Yadav, Faraz Alvi, Shivang Mehta, Shantanu Prasad, Sourav Mondal and Mridul Kantikar. A special thanks to the Uttar Pradesh Forest Department, field staff of the Dudhwa Tiger Reserve, Tiasa Adhya for her research guidance, and Prof. Amita Kanaujia, University of Lucknow. – Ed.

Author Speak

Sanctuary Asia provided me a platform to speak about the fishing cat when no one else knew and no one else did. I shall forever be grateful to this great voice for nature that has, through the years, managed to advocate for nature, attract young minds and provided a stage for spokespeople such as I. It was an honour to write a cover story on fishing cats in this issue and I must admit I thoroughly enjoyed writing it – the

ARPAN SAHA

article did flow out of me – but more than that, my heart and mind wanted to team up with *Sanctuary Asia*. Thank you for giving the fishing cat this lovely and unique opportunity.

Tiasa Adhya, Kolkata

The angel's trumpet, aka the *Brugmansia* is special – no wild population has ever been found of the handful of species in this genus. After its introduction to India in the 1900s, *Brugmansia* has become an unlikely resident of the Himalayan foothills. Could its incorporation into its new home signal the formation of 'novel ecosystems'?

Soham Kacker, Delhi

Truly humbled to share that my interview with *Sanctuary Asia* has been published. It's an incredible experience to have the chance to express my opinions on topics such as AI, technology, and social media and how they create a positive influence on wildlife conservation amidst an elite group of individuals.

Sushmitha Reddy, Bengaluru

SUSHMITHA REDDY

BEARING WITNESS

By Bittu Sahgal, Editor, *Sanctuary Asia*

Though the will to protect wild nature is waning by the minute, India still has some of the world's finest environmental legislation on paper. Other nations of the world should study India's laws to understand how to offer legal protection to wild species and habitats. That said, I would not suggest they take a leaf out of our book concerning the *will* to implement the carefully worded laws that once largely mirrored our ancient attitudes to nature. While one set of people work to rewild India, others bear witness to the fact that, by policy, large tracts of India's (and the world's) life-saving ecological assets are being squandered, all trumped by human infrastructures focused on economics, not survival.

The Heat is On *This graphic drone image of a forest burning in Badlapur, Maharashtra, India, represents the ongoing fate of the world's forests as soil moisture evaporates, rainfall patterns become increasingly unreliable and the oil, coal and gas industries keep pumping more and more carbon into the Earth's atmosphere, turning our once-safe home into a crematorium for species uncounted, including* Homo sapiens. *What goes around does come around – forest fires are mostly man-made in India, and there can be a marked increase as temperatures soar in coming years.*

Man Bites Shark *What you see in the image is a hammerhead shark caught off the waters of India's financial capital, Mumbai, laid out for consumers to buy, slice and forget. The late Bhai Bhandarkar and Rambhau Patil, charismatic leaders of Maharashtra's* Machhimar Kruti Samiti, *had convinced the fishing community to unite to protect sharks, corals and mangroves, which were also protected by Indian law. Bhandarkar and Patil have left us. Sadly, sharks and countless other marine species seem poised to follow suit, as their near-shore breeding grounds are under assault by developers of all stripes.*

World War III? *A lone tusker seems to look wistfully at tea estates and human dwellings, carved from the forests of Valparai, Tamil Nadu, India, where its ancestors once roamed free. Species conservation is not an animal rights issue, it's a human rights issue! If the elephants go, we go. Respected economists such as Lord Nicholas Stern and Professor Partha Dasgupta have been screaming hoarse about the imperative of protecting wild species of plants and animals as a strike strategy to ward off the worst impacts of our galloping climate crisis.* Homo sapiens *vs. the rest of all living things is literally World War III, which we have been dreading and which we are destined to lose; unless we live up to our* sapiens *name and sue for peace with nature.*

Bear Necessities *Two brown bear cubs play-fight, just 50 m. from their watchful (out of frame) mother, in preparation for later life when battles for mates and territories will become real. This image shot in Dras, Kargil, Jammu & Kashmir, reveals the snows of the high Himalaya, upon which the future of bears, snow leopards, red foxes, tahr, ibex, marmots, and Black-necked Cranes depend. But, like the ice in the North and South Poles, Himalayan snows too are vanishing like ice cubes in boiling water. And when the ice melts, these animals, adapted to their frozen home for millions of years, will vanish too. As will the naked ape, whose fate is enmeshed with those of the animal and plant species we humans have come to treat as raw material for short-term economic objectives.*

Sanctuary Asia

MEET THE TEAM

Bittu Sahgal

Editor, Sanctuary Asia.

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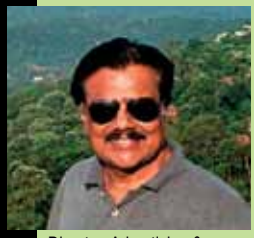

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