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Tigers' world revealed **03** | Sky Islands **08** | Wastelands of the mind **16** | Nigel Collar **24** | Dhangars **31**





# contents

## photo-story

**03** **Revealing the world of the tiger**  
STEVE WINTER AND SHARON GUYNUP

## features

**08** **Mountaintops in the sky**  
SANDHYA SEKAR

**16** **Wastelands of the mind: Identity crisis of India's tropical savannas**  
ABI TAMIM VANAK, ANKILA HIREMATH,  
NITIN RAI

## interview

**24** **NIGEL COLLAR** talks to  
Shreya Dasgupta

## perspective

**31** **Day out with a herder**  
KALYAN VARMA

## on bookstands

**36** **Cats in crisis**  
CAITLIN KIGHT

**38** **Garro hills butterflies**  
ULLASA KODANDARAMAIAH

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Cover art by Prabha Mallya

Grasslands and conservation? For most people, that would make sense if one were talking about the African savanna, with its vast herds of wildebeest, gazelles, zebras, giraffe and their large charismatic predators, the lions, cheetahs and wild dogs. But by and large, the topic of conserving grasslands, with their apparently sparse vegetation, harsh climates, and seemingly low productivity, makes little sense to most people. In fact, in large parts of the world grasslands have all but been converted to other land uses, whether agriculture or industry. This is a travesty, given their ecological as well as economic and cultural importance. Grasslands have a unique biota associated with them. The prairie bison of the North American Midwest, the Bactrian camel of the Central Asian steppe, the blackbuck of India's tropical grasslands, the rhinoceros of the Terai floodplain grasslands of South Asia, Africa's ostriches, bustards the world over...the list could go on. Also associated with grasslands around the world are pastoral economies and cultures, exquisitely fine-tuned to these dynamic and unpredictable environments.

In this issue we feature a series of articles on grasslands in India. Abi Tamim Vanak and others describe the widespread perception of grasslands as unproductive wastelands, and the historical as well as ongoing conversion of these landscapes to more 'productive' uses. Kalyan Varma provides an account of the traditional ecological knowledge of a pastoral community, the Dhangars, in a counter to the widespread notion of pastoralism as ecologically degrading. Sandhya Sekhar highlights the shola-grassland ecosystem of the Western Ghats in India, and its unique flora and fauna. Finally, Nigel Collar talks about his work with bustards—grassland-specialist birds that are threatened globally, largely due to threats to their habitat. He ends on a positive note by saying we may yet be in time to save these endangered birds, if we were to focus on conserving the last remaining vestiges of their grassland habitats.

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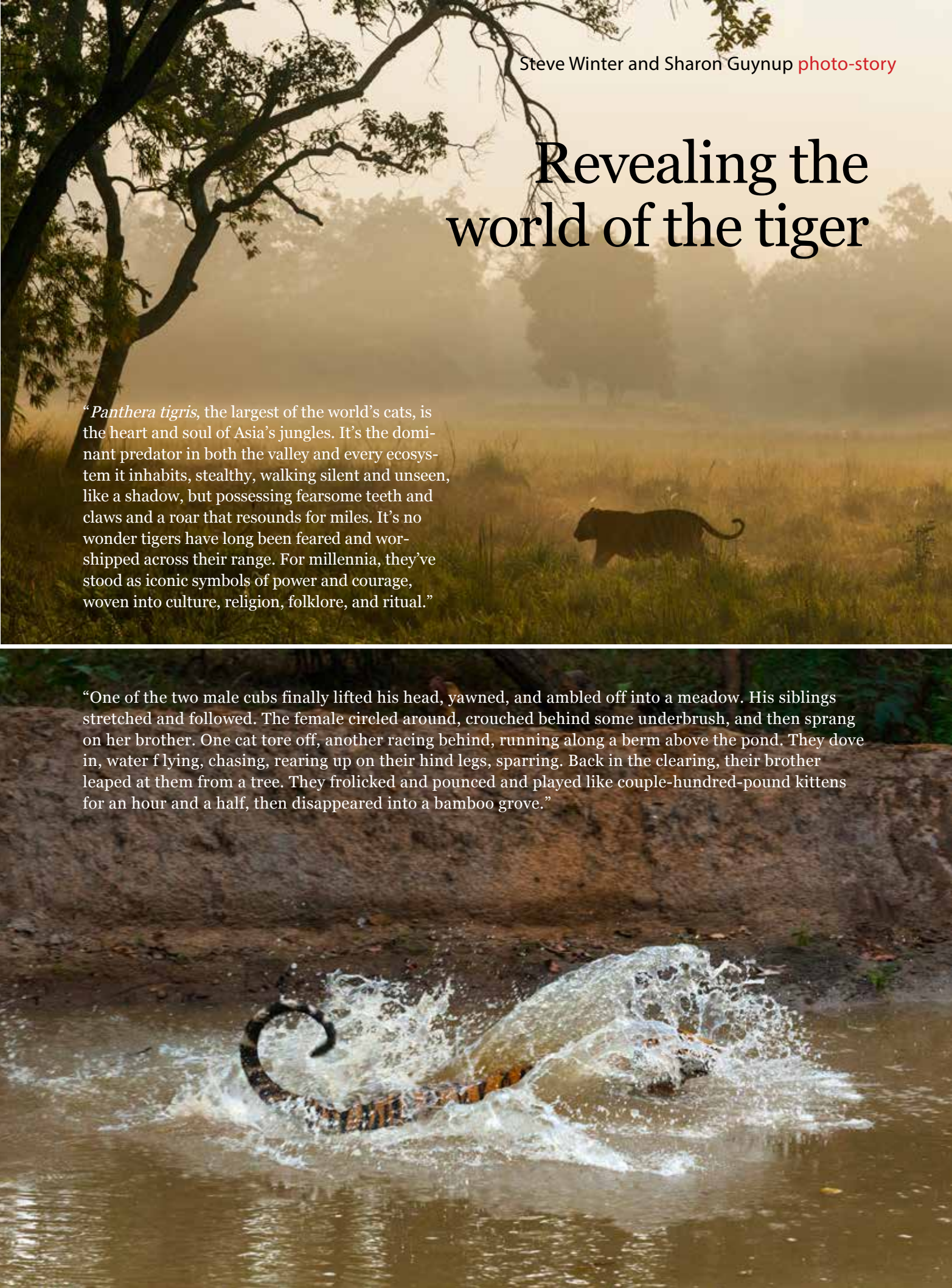
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# Revealing the world of the tiger

“*Panthera tigris*, the largest of the world's cats, is the heart and soul of Asia's jungles. It's the dominant predator in both the valley and every ecosystem it inhabits, stealthy, walking silent and unseen, like a shadow, but possessing fearsome teeth and claws and a roar that resounds for miles. It's no wonder tigers have long been feared and worshipped across their range. For millennia, they've stood as iconic symbols of power and courage, woven into culture, religion, folklore, and ritual.”

“One of the two male cubs finally lifted his head, yawned, and ambled off into a meadow. His siblings stretched and followed. The female circled around, crouched behind some underbrush, and then sprang on her brother. One cat tore off, another racing behind, running along a berm above the pond. They dove in, water flying, chasing, rearing up on their hind legs, sparring. Back in the clearing, their brother leaped at them from a tree. They frolicked and pounced and played like couple-hundred-pound kittens for an hour and a half, then disappeared into a bamboo grove.”





“...Konwar rounded a bend, stopped short, and killed the engine. He whispered, ‘bagh,’ Assamese for tiger. A big male lay in the road sleeping. Just beyond, 28 elephants munched away in a field of shiny, palm-leafed rattan. Three times, when the cat slipped into the grass, the herd quickly formed a protective circle around the calves, his target. The matriarch charged, trumpeting, and he returned to the road, napping until his next halfhearted attempt. It was my first real opportunity to watch a tiger up close, to really see the intricate markings on his face, his mammoth paws, his golden eyes, the reddish amber sheen of his coat, slashed by random stripes.

Two hours later, he gave up. As he walked away, I photographed him, those stripes melting into the landscape, perfectly camouflaged in the elephant grass.”





“Only about 3,200 wild tigers survive, and of those, less than a third are breeding females. They’re gone from 93 percent of their historic range; that range shrank by almost half during the first decade of this century. Tigers hang on in just 13 countries in scraps of habitat sandwiched amid an exploding human population. In 2010, they were declared extinct in Cambodia. (In contrast, at least 4,000 captive tigers are privately owned in the United States alone, living in people’s backyards, lost to the wild and often living miserable, caged lives.)”



*The photographs and excerpts are from the book “Tigers Forever” by Steve Winter, a photojournalist at the National Geographic Magazine and Sharon Guynup, a freelance journalist, sharonguynup@me.com.*

“Rigging up a camera trap takes hours. I place a camera and three flashes inside waterproof cases and then secure them to trees or posts that we pound into the ground. Here, we tried to position them where they wouldn’t be kicked by rhinos or where elephants wouldn’t rip them apart with their trunks. Then we wired it all to a TrailMaster transmitter and receiver and camouflaged the equipment with foliage. Any movement that broke the transmitter’s infrared beam fired the camera and the flashes.

Tigers are difficult to find in that landscape, but we found signs everywhere.

We saw long scrapes on the ground and deep scratches etched into trees. Some areas were thick with their musky scent. These calling cards help the solitary cats find a mate, advertise their presence, and mark territory. It’s a way to avoid surprise encounters that could prove fatal. Their markings also pointed out prime spots for me to set up remote cameras: trails, rocks, caves, or trees that I hoped the cats would return to. Sometimes they did.”





# Mountaintops in the sky

Walking along a narrow strip of forest and ducking overhanging branches covered in a thick layer of moss, I took a rattling breath that filled my lungs with water droplets. Heading up the misty mountains without adequate warm clothing was not one of my better decisions. As I peered ahead into the lightening gloom, I could see the trees were thinning out. One last duck, and there was the view I wanted: rolling grassland. Kilometres of gently undulating grassy slopes, the occasional lone tree, and forest clumps in the valleys between mountains.



This habitat, called the shola-grassland mosaic, is found on the mountaintops of the Western Ghats of southern India, a mountain range parallel to the west coast of the country. “Shola” is the word for “forest” or “grove” in Tamil, one of the main languages spoken in southern India. The elevation above which this habitat is found varies from as low as 1050 metres to above 1700 metres. This depends on how isolated a particular mountaintop is, and its distance from the coast.

The climate in the upper altitudes, and hence the vegetation, is entirely different from what is found in the lower elevations, just a few kilometres down the mountainside. Shola-grassland ecosystems are thus “sky islands”—habitats that include a chain of mountains and valleys, with the mountaintops akin to “islands” of different vegetation in an “ocean” of valleys.

THE SHOLA

The forests that grow in clumps in the valleys of the hills have a distinctive appearance: stunted trees of about 16-20 metres in height, close growing in such a manner that the branches of

neighbouring trees interlock. These branches are usually laden with epiphytes—plants like orchids and mosses that grow on larger plants—making the shade underneath almost impenetrable.

Dr Meher Homji from the French Institute, Pondicherry, observed something fascinating about these forest clumps. Their interiors contain species that are tropical in origin, i.e. most of their relatives are found in tropical areas, in this case from Western Ghats and Sri Lanka, or the Indo-Malayan region (South-East Asia). These belong to the plant families Lauraceae, Rubiaceae, Symplocaceae and Myrtaceae. Closer to the edge of these forest clumps, in the areas exposed to the surrounding grassland, the species found are not tropical (as one would expect so close to the equator), but temperate in origin.

Trees of the genus *Rhododendron* are an excellent example of temperate species having established themselves in a tropical mountain. Botanists first encountered one species of *Rhododendron* in the Western Ghats, one in Sri Lanka, and a burst of about 87 in the Himalayas. The initial guess was that the Western Ghats and Sri Lankan species

would be different from the Himalayan species, given the thousands of kilometres that separate them. Recent studies have shown that the Western Ghats species *Rhododendron nilagiricum* is technically *Rhododendron arboretum subsp nilagiricum*—a subspecies of *R arboretum*, a widespread Himalayan species. The tree genus *Pedicularis* also has many species in the Himalayan meadows, but only two from the Western Ghats sholas—*Pedicularis perrottetii* and *P zeylanica*. *P zeylanica*, as the name indicates, is also found in the sky islands of Sri Lanka.

This fascinating similarity between the sky islands of Western Ghats and Himalayan vegetation, thousands of kilometres away, has intrigued biologists for many decades. Sunder Lal Hora, a fish biologist who was studying fish living in torrential streams, came up with the most influential hypothesis: there was a once continuous corridor of tropical evergreen forests from the Himalayas of Northeast India and the Western Ghats, via the Vindhya and Satpura ranges of Central India. From 2.5 million years ago to about 11,000 years ago during the Quarternary period, the earth as a whole experienced cycles of dry and wet periods; in India especially, evidence shows that certain tracts of northern India were much wetter than they are today.

*This fascinating similarity between the sky islands of Western Ghats and Himalayan vegetation, thousands of kilometres away, has intrigued biologists for many decades.*

There is also evidence that at around the same time, large tracts of India were much colder than what they are now, allowing some temperate Hi-

malayan species to reach the Western Ghats. Some lived on in the cold shola grasslands; other species that ended up at lower elevations would probably have died out, after India warmed up to how it is now. The Himalayan species could tolerate the ground frost in the open grasslands much better than the “tropical” species that are found inside the shola forests.

THE GRASSLANDS

*Strobilanthes kunthiana*, or “neelakurinji” in Tamil, is a strange plant. It grows in large clumps wherever it can, in the grasslands of the sky islands. Once in 12 years, all the plants flower together, set seed and die. When they flower, entire hillsides transform into a blue carpet. This is what prompted the name Nilgiris, or Blue Mountains (“Nil”—blue, “giris”—mountains). When these plants flower, bees and other insects delight in the rich nectar; when the flowers eventually set fruit, they form rice-like seed that makes rats and other rodents go into a feeding frenzy. However, there are so many seeds that enough survive the rodents, and start growing after the next rains. They remain unremarkable, small green bushes until 12 years after, when they flower and transform the mountains again.

The *S kunthiana* flowering is a dramatic event, but the grasslands boast of a bewildering variety of plants. For instance, a rapid assessment of the Mukurthi National Park in the Nilgiris range by a team from Gurukula Botanical Sanctuary came up with an astonishing 198 species from just 77 square kilometres. Some species form mats so dense that no ground can be seen; others grow in patches on hilltops, and still others tolerate fire events and sprout back after a shower. Some species colonise marshes, and others grow on seemingly inhospitable vertical rock faces.

The community composition of the grassland was found to be strongly related to environmental and soil factors, like depth of soil, presence or absence of rocks and boulders, grazed and/or burnt conditions, forest-grassland edges and rocky or non-rocky slopes. Like the Himalayan affinity seen among the shola forests, the grasslands have grass and herb genera that are largely found in temper-



Ullasa Kodandaramaiah

ate areas, like *Gentiana*, *Senecio*, *Rubus*, *Potentilla* and *Geranium*.

The genus *Impatiens*, much cherished in gardens as the popular balsams, have about a hundred known species in the Western Ghats. Some balsams seem to grow out of sheer rock, with nothing but the beautiful flower to mark the plant; some are found near streams, some in marshes, and some are small shrubs along the roadside. After being pollinated, the pod like fruit bursts open when ripe, spewing out seeds in a mini explosion that can feel very powerful in the palm of your hand. Now you know why they're called *Impatiens*.

THE ANIMALS

Perched on one such grassland top in Meesapuli malai in Munnar, a friend and I spotted sudden movement on the adjacent mist-covered hilltop. A herd of tahr leapt gracefully across a craggy, impossibly steep slope with all the grace in the world. Somehow, they could sense our eyes on them, though we were separated by a deep valley unsuited for booted humans, but akin to a high-way to the agile mountain goat.

The Nilgiri tahr, *Nilgiritragus hylocrius*, is endemic to the sky islands of the Western Ghats. Its nearest relative is away in the Himalayas, adding to the list of interesting relationships between species separated by thousands of kilometres. The Nilgiri tahr is critically endangered now, with isolated populations in the Anamalais and Nilgiris the last stronghold for this iconic species.

Apart from the Tahr, the high mountains are also



home to the elusive Nilgiri marten and the critically endangered Nilgiri langur, whose distinctive whooping calls occasionally pierce the silence of the sky islands, rolling in with the mist. On Chemmunji peak in Peppara Wildlife Sanctuary in the South Indian state of Kerala, one is certain to find herds of gaur grazing near the hut that accommodates trekkers, in this area, which is rightly called “Abode of the Gaur”. Tigers and the wild dog, dhole, can also be seen in the sky islands.

Recent research has been proving the existence of species as yet unknown to us from these sky islands. Since each island is separated from others by valleys of unsuitable climate and vegetation, species that cannot move too much, like frogs, become isolated in these islands over millions of years—there is room for many new species to be discovered in this landscape.

THE SKY ISLAND ENVIRONMENT

Most rainfall here is from the Indian monsoons. The southwest monsoon between April and September gives variable rain across the sky islands, in some areas as much as 7000 mm. Because of the geographic orientation of the Ghats, the western slopes, rather than the eastern slopes, receive most of the southwest monsoon rainfall. The eastern slopes receive rainfall from the northeast monsoon

and from cyclonic storms in the Bay of Bengal.

The soil from the grasslands is calcium-deficient, derived from parent rocks, which are usually gneiss, charnockites and schists. Typically, the soil is shallower in grasslands than in shola forests; this, combined with a lack of shade, makes it more prone to moisture loss. During the dry season, shola soils have been shown to retain about twice as much moisture as that accumulated in the surrounding grasslands.

The shola forests provide cover and reduce erosion of soils under them. The net amount of precipitation under the shola canopy is indiscriminately high—apart from rainfall, the forests also sequester wind-driven fog onto tree crowns. The forests act as sponges that soak up all forms of precipitation, which is then released as mountain streams that coalesce to form the headwaters of all major rivers originating in the Western Ghats.

*The forests act as sponges that soak up all forms of precipitation, which is then released as mountain streams that coalesce to form the headwaters of all major rivers originating in the Western Ghats.*

A DUAL CLIMAX

Analysis of peat samples from shola fragments in the Nilgiris show that shola and grasslands have undergone cyclical shifts in dominant vegetation type. Raman Sukumar and others found that pollen preserved in peat in the high altitude areas of the Nilgiris provided excellent resolution of past climatic events. Grasses dominated 20,000-

16,000 years ago during an arid period. This was followed by a wetter phase, around 12,000 years ago, which ushered in an age where the shola forests were dominant. Around 6000 years ago, the monsoon weakened, resulting in a drier period where grasses dominated once again; this is approximately what we see today.

There have been many theories about why grasslands and forests exist side-by-side in such a manner, over time. Existence of such “alternate stable states” has been shown theoretically using modelling exercises, but not with actual data from field observations, says Mahesh Sankaran from the National Centre for Biological Sciences, who researches grassland-forest dynamics. “Whether or not the shola-grassland mosaic actually represents a dual climax is unknown. Even if there was such a state, whether the factors responsible are fire, or herbivory, or frost, is as yet unknown.”

He further adds, “We must remember that the sholas typically occur in certain kind of areas in this mosaic, like valley depressions and along streams. This raises the question, Do these areas represent a fundamentally different environment from the grasslands? In that case, they probably do not represent ‘alternate’ states. A way to test this would be to prevent all kinds of external forces from acting upon a shola-grassland system, i.e. experimentally change any/all of the suspected triggers—would the grassland switch to a forested state?” Only further research can solve this intriguing puzzle.

PEOPLE

The first human occupation of the Western Ghats region occurred around 12,000 years ago during the late Paleolithic. The first signs of agri-pastoralism date to around 3000 to 5000 years ago. We don’t know much about the early settlers or their origins. Some studies have speculated that the Harappan people from the ancient Indus Valley Civilisation, which extended from what today is northwestern India, Pakistan and Afghanistan, migrated southward to the hills. Today, we see a variety of tribes, such as the Kani in the southernmost Agastyamalai hills, the Koravas in the Anamalai hills and the Todas and Badagas in the Nilgiris.





The British rule abolished slash-and-burn cultivation, and began large-scale commercial plantations of cash crops, including different species of eucalyptus, acacia and pine across most areas, and tea in the higher elevations. Their idea was to replace what they considered unproductive grasslands, and tracts of slow-growing shola forests, with fast growing, economically useful species. Post-independence, plantation programmes also received national budgetary support, to feed timber and pulp industries. Settlements in the hills have also increased, with fruit orchards and vegetable gardens replacing both shola and grassland.

CONSERVATION

Collection of small timber from the sholas, destruction of the shola-grassland habitat and an increase in invasive species like *Eupatorium glandulosum* and *Ulex europaeus* have together resulted in about 30 grassland species being categorised

as endangered in Eravikulam National Park, and about 70 rare or threatened species in the Palanis.

The red-disc bush brown is a butterfly species that lives only in the shola-grassland mosaic of southern Western Ghats, and nowhere else in the world. In a recent study, researchers have shown that the butterfly is finding it difficult to navigate the “valley” between two adjoining sky island complexes—the Munnar area to the west of the Ghats and the Kodaikanal area to the east of the Ghats. The approximately 50-kilometres wide “valley” has higher temperatures and lower rainfall than the sky islands on either side.

Across the same landscape, the white-bellied shortwing, a bird found only in the shola forests of the Western Ghats, has been changing the way it sings. Robin Vijayan and his colleagues have been working on this bird for a few years, and they have recorded birds calling from different forest patch-

es. Birdsong is something chicks learn from parent birds. The isolation of birds into their own forest patches is causing them to develop dialects distinct from those in other forest patches; and since birds are not flying between the forests, the different dialects are not mixing, and their songs are growing more and more different from each other.

*Birdsong is something chicks learn from parent birds. The isolation of birds into their own forest patches is causing them to develop dialects distinct from those in other forest patches; and since birds are not flying between the forests, the different dialects are not mixing, and their songs are growing more and more different from each other.*

These studies are just the beginning, indicating the great extent to which disturbance is affecting this fragile, breathtaking habitat. After the centuries old history of intensive management and land use practices, which began during the British rule, and has been continued, we will never really know how they would have been in all their glory. Travelling in Munnar and Kodaikanal during the last mass flowering of *Strobilanthes kunthiana* in 2006, I could see isolated patches of blue. Traditionally, the bush would have covered the hillside forming continuous blue carpets. Now invasive bushes like bracken have taken over the space



Ullasa Kodandaramaiah

that *S kunthiana* would have occupied, making them a figment of my imagination, brought to life after reading descriptions, some as old as ancient Tamil literature. Judging from these sources—and the fact that the entire Nilgiris was named after the blue buds of a single flowering bush—the unspoiled mountains must have been something remarkable. Whether the next generation even sees a fraction of the sky islands’ isolated beauty is truly in our hands.

Further reading:

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Ullasa Kodandaramaiah





## Wastelands of the mind: The identity crisis of India's tropical savannas

*"I had had some very good black-buck shooting at Indore in January. Captain Norman Franks, the commissioner there, took me out one morning into the Maharajah Holkar's preserves, and on a large plain we once saw quite a thousand buck in different herds."* Colonel Cuthbert Larking, Bandobast and Khabar, 1888.



If Colonel Cuthbert Larking were to time travel and today visit the same area around Indore he would be hard pressed to find even a few blackbuck. Indeed, he would barely recognise most of the Central Indian landscape that he, and numerous others, so eloquently wrote about in their travels. The reasons for this decline in blackbuck and of many other grassland species is intrinsically linked to the marginal position that these landscapes have occupied in the developmental and conservation debates in India.

Much has been written about the loss of forest cover in India during the pre- and post-independence era. However, the loss of non-forest habitats has received very little attention. Indeed, successive governments since independence have continued a colonial tradition of defining land use categories based on their “productivity”. Take, for instance, the definition of “wasteland”, first propounded by John Locke in 1680. According to the anthropologist Judy Whitehead, Locke’s “concept of wasteland, as opposed to value-producing land, constituted a founding binary opposition that constructed how landscapes were categorised... Associated with wildness, wilderness, and savagery in the 19th century, the category of wasteland also defined who would and who would not become most vulnerable to dispossession and/or enclosure”.

Thus, common village lands that were used for pastoralism and that were essentially untaxable, were deemed wastelands. These were appropriated by the state and divided amongst the peasantry, because it was assumed that private ownership and intensive cultivation was the only way to make land more productive.

As a result of these myopic and misguided policies, the government has classified large swathes of the country as wastelands. The Wasteland Atlas of India produced at great cost every few years by ISRO(Indian Space Research Organisation) for the Department of Land Resources (Ministry of Rural Development) has some logic-defying categories. Waterlogged areas and marshes, which are known to be essential for groundwater recharge; mountains under permanent snow, the source of our greatest rivers; savanna grasslands and pasture-



The great Indian bustard is on the brink of extinction due to hunting and massive loss of semi-arid savannas.

Kalyan Varma

lands, on which depend the lives and livelihoods of millions of livestock and pastoralists; deserts, sand dunes, rocky outcrops, inselbergs, and plateaus, rich geological features that are also home to a unique set of fauna and flora; are all wastelands! According to this atlas, approximately 15% of the country is currently lying waste (that’s 46,000 square kilometres, an area larger than Switzerland).

*Thus, common village lands that were used for pastoralism and that were essentially untaxable, were deemed wastelands. These were appropriated by the state and divided amongst the peasantry, because it was assumed that private ownership and intensive cultivation was the only way to make land more productive.*

The idea that wastelands are unproductive continues to be pervasive and is used by various agencies to gain control over marginal landscapes and remake them for productive purposes, with dire results. Jairam Ramesh, as the Minister for Environment and Forests, sought to cordon off large stretches of grassland for a project to reintroduce cheetahs in India.

“It is important to bring the cheetah back as it will help restore the grasslands of India”, he said when approving the plan (The Guardian, 29 July 2010). A change in his ministerial portfolio to Rural Development appears to have necessitated a different strategy that aimed to acquire savanna grasslands and other habitats for development. “Maharashtra, Madhya Pradesh, Rajasthan, Jammu & Kashmir, Andhra, Himachal have significant percentage of wasteland that can be exploited for development purposes” he is reported to have said (Times of India 16 October 2013). Even the benign sounding Integrated Watershed Development Program under his Ministry has destroyed large tracts of semi-arid savanna grasslands in Maharashtra through massive land transformation using heavy machinery to ostensibly improve these wastelands.

Of the various categories of so-called wasteland, savanna grasslands have suffered the most in India both historically and in current times. Under the British, nomadic pastoralists were sedentarised, and the grasslands they depended on were converted to agriculture using canal irrigation. The resultant salinisation of these soils has now well and truly rendered once productive grasslands to wastelands. The Indian forest administration has also carried on the legacy of the British. They assume that forests were the natural vegetative cover in India, and any forest “blanks” were an aberration, or a sign of a degraded ecosystem, and continue to raise tree plantations across the countryside. Indeed, this mistaken notion that equates “eco-friendly” with tree planting has driven India’s green initiatives such as the “Green India Mission”, and the Compensatory Afforestation Programme and Management Authority (CAMPA). Such thinking betrays a certain ecological illiteracy, and ignores the fact that grasslands, and their associated fauna, have existed in India over many millennia. For instance, C3-grasses existed in India as far as 50 million years ago, as evidenced by fossil records; and C4-grasslands may have been widespread on the Indian subcontinent by about 7 million years ago.



Abi Tamim Vanak

Ironically, grasslands are under most threat from the forestry departments, which sees these areas as degraded ecosystems and therefore candidates for afforestation activities.



The forest-centric bias in policy and management seems to have also clouded the judgment of scientists and cartographers who have continued to label tropical savannas in India as tropical dry forests, or worse, as tropical dry forests degraded by different forms of human use, especially livestock-grazing and fire. Jayashree Ratnam and co-authors, who have studied savannas all over the world, have suggested that in India some “*areas that are categorised as tropical dry forests should in fact be considered tropical mesic savannas*”. They draw upon studies from other tropical savannas to suggest that the features distinguishing savannas from tropical dry forests are the presence of a C4-grass-dominated understory and a suite of trees uniquely adapted to the occurrence of fires, unlike trees of tropical dry forests.

The contention that savanna grassland systems are unproductive is untenable. The economies of several countries depend heavily on grasslands. Not for a moment would anyone consider labeling the vast savannas of the Serengeti with their

spectacular assemblages of large fauna as wastelands, nor the areas inhabited by reindeer herding Lapps in Norway and Sweden. Why then do we in India, with more than 500 million livestock dependent on our grasslands, and millions of pastoralists dependent on them for their livelihoods, consider these areas as wastelands? Previously this categorisation of wastelands was from an agro-centric perspective, i.e., land that did not grow food that could be taxed was land lying waste; in recent times, declaring land as wasted has become the easiest way to grab it in the name of industrialisation and development. Examples of such appropriation abound: the allocation of approximately 10,000 acres of “*kavals*” or grazing lands in Karnataka to defence, atomic research and academic institutions and a handful of private companies; the setting up of solar and wind farms for power generation in many parts of the country; and the implementation of Forest Department working plans that promote the planting of *Prosopis juliflora* for charcoal production as in Kutch, Gujarat.



Kalyan Varma

Ironically, grasslands are under most threat from the forestry departments, which sees these areas as degraded ecosystems and therefore candidates for afforestation activities.

**CORRECTING HISTORICAL BIASES – THE WAY FORWARD?**

To bring some balance to this narrative, and to determine the status of savanna grasslands in India, the first author and his team set about mapping the semi-arid regions of peninsular India. This was trickier than anticipated. Unlike forested areas of India, which are easily delineated using even coarse scale satellite imageries, the spectral signature of grasses is easily confused with rain-fed agriculture, and horticulture, forestry plantations and isolated trees in agricultural fields are easily confused with woodlands. Thus, multiple methods at multiple scales were needed to classify savanna systems.

*Not for a moment would anyone consider labeling the vast savannas of the Serengeti with their spectacular assemblages of large fauna as wastelands, nor the areas inhabited by reindeer herding Lapps in Norway and Sweden. Why then do we in India, with more than 500 million livestock dependent on our grasslands, and millions of pastoralists dependent on them for their livelihoods consider these areas as wastelands?*



Abi Tamim Vanak

The Indian fox is most commonly seen in areas with large contiguous grasslands.

The mapping exercise started at a coarse scale with bioclimatic variables and a “greenness index” (NDVI) derived from satellite imageries to build a model of where savanna grasslands “should” be. They then used this potential savanna map to identify areas where a more detailed supervised classification derived from freely available Landsat imageries could be conducted. However, the supervised classification, which consists of using ground truth points to verify maps generated by remote sensing analysis software, yielded results that were less than satisfactory in terms of their accuracy. To resolve this and to generate fine-scaled maps at district levels, they used 5.6 m resolution imageries from the ISRO’s IRS P4 satellite. This yielded high-resolution maps of semi-arid savanna grasslands for the first time in India.

These maps paint a grim picture. Throughout the Central Indian landscape, large contiguous areas of semi-arid savannas are restricted to only a handful of sites spread across Andhra Pradesh, Karnataka, Madhya Pradesh and Maharashtra. These pockets of savanna cover approximately 20,000 square kilometres and constitute between 2 to 11% of the respective states’ geographical area.



Yet, even as surveys of these grasslands were ongoing, vast areas of grasslands continued to be destroyed. Much to the dismay of the survey team, some of the finest grasslands in Maharashtra were being actively worked using heavy machinery under a government-funded scheme to ostensibly prevent soil erosion and run-off. These, and many other such ill-advised schemes are routinely targeted at improving grasslands and other wastelands. The perception of non-forest areas as being wastelands is deep-rooted and changing this perception will require a recognition of three main issues:

1. Non-forest areas, especially grasslands, marshes and even rocky outcrops and glades are not marginal habitats, but are as important as other forested systems. Indeed many of these habitats not only have unique sets of flora and fauna, but also human livelihood systems that are exquisitely adapted to these systems. For example, savanna grasslands support several endemic and critically endangered species such as the great Indian bustard and blackbuck. They are also home to nomadic pastoralists who have over centuries developed complex rotational grazing systems to prevent over-grazing and take advantage of the seasonally ephemeral resources.

2. The categories of wastelands developed by the government are based on their ‘productive’ potential resulting in the demarcation of these areas for subsequent ‘improvement’. However, this delineation is based on a highly biased, archaic notion of production, often ignoring the cultural, ecological and traditional association of local people with the land. For example, most of the upper reaches of the Himalayas, and almost the entire district of Ladakh are classified as wastelands. The forms of ‘improvement’ that are envisaged for these non-forested wilderness areas conform to ideas of forested, irrigated or industrialised landscapes, and are ecologically ill informed, culturally insensitive and ignore centuries of customary practice.

3. The exercise of wasteland categorisation violates several laws and policies of the government. Several wildlife sanctuaries and national parks (e.g. Kutch wild ass sanctuary, Hemis national park, Rollapadu blackbuck sanctuary) notified under the Wild Life (Protection) Act (1972), wetland and marshes that are notified RAMSAR sites, sand dunes that protect our coasts from storm surges and are notified under the Coastal Regulation Zone are all labeled as wastelands.



An icon of the Indian savanna, the blackbuck antelope, once counted in the thousands, is now isolated to a few pockets of grasslands throughout the country.



The grasslands of the terai belt in northern India support some of the highest densities of wild fauna in the country.

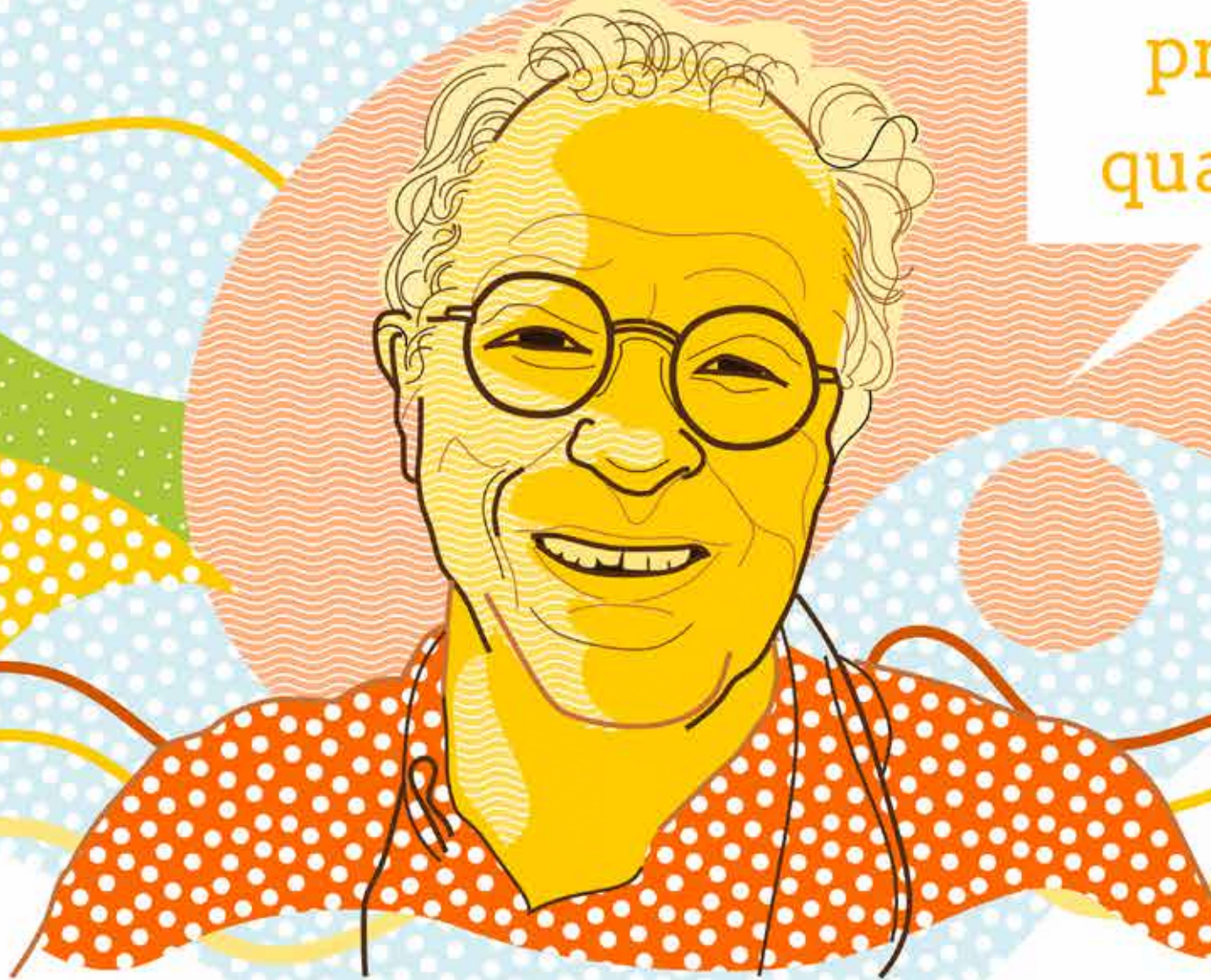
*There is thus a clear need for a policy shift away from these archaic and colonial categorisations of landscapes, to one that is more in tune with the socio-ecological fabric of our country. One that values land intrinsically, and not just as a means of production from a very narrow economic perspective.*

There is thus a clear need for a policy shift away from these archaic and colonial categorisations of landscapes, to one that is more in tune with the socio-ecological fabric of our country. One that values land intrinsically, and not just as a means of production from a very narrow economic perspective. One could argue that the only ‘wastelands’ in the Wasteland Atlas of India are industrial and mining areas. The rich diversity of landscapes in India deserve better than the ignominy of being called wastelands.

Abi Tamim Vanak is a National Environmental Science Fellow working on landscape mapping and conservation prioritisation of Indian semi-arid savanna grasslands. He, Ankila Hiremath and Nitin Rai are members of the Savanna Grasslands Working Group at the Ashoka Trust for Research in Ecology and Environment, and are part of a long-term multi-institutional research effort, “Research and Monitoring in the Banni Landscape (RAMBLE)” in the Banni grasslands of Kutch, Gujarat, [avanak@atree.org](mailto:avanak@atree.org).



"Nervousness is probably a good quality in the wild."



# NIGEL COLLAR

*His love for birds eventually took him to the world of threatened bustards, perhaps a far cry from the doctorate degree in English Literature that he received from the University of East Anglia. For the last four decades since then, he has worked extensively on numerous conservation projects to protect bustards and other birds all over the world. He has written more than 100 scientific papers and 12 books including BIRDS AND PEOPLE: BONDS IN A TIMELESS JOURNEY and FACING EXTINCTION: THE WORLD'S RAREST BIRDS AND THE RACE TO SAVE THEM. He has served as the Director of Science and Director of Development at BirdLife and has helped develop the IUCN Red List criteria to assess the status of threatened species. In this interview he talks to Shreya Dasgupta about grasslands, and as he calls them, 'their inglorious bustards'.*



*SD: Why are grasslands threatened?*

NC: I think grasslands are in some respects more under threat because they are not regarded in the way as forests are. Forests are of course under huge threat, and we shouldn't disregard them at all. But threats to them are more visible and can be tracked better. For example, even identifying grasslands from satellites is problematic. The trouble is that grasslands look so much like fields, that people don't realise that they have a real biological importance. Whereas everybody recognises that forests are important. I think the advocacy for grasslands is also much much less than it is for forests. That puts them much more at risk. There are fewer of these grasslands, and most of them are converted in Eurasia and gone in South East Asia. So saving grasslands is an absolutely fundamental thing for conservation biologists to be doing.

*SD: Are grasslands protected in places that you have worked?*

NC: It's not easy to answer. In Uzbekistan, none

of the grasslands are given protection as nature reserves. Southwest Ethiopia where I worked on threatened larks is not protected either. I also work in Portugal and Spain and they do have a European conservation status, which is not particularly well enforced. It is OK, but not necessarily the right solution. But I can't give you any figures on that.

That scenario might change, but it will depend on someone becoming an advocate for the grasslands. Like lots of protected areas in West Africa and Madagascar were created by primatologists who were absolutely in love with their study animals and they just had to get these protected.

*SD: Can captive breeding save highly threatened species?*

NC: It is very context-specific and dependent. There are some animal species that are very amenable to captive breeding and they can be introduced, without much difficulty, into a particular habitat, and they will stay there. There are other

species that are difficult to breed in captivity and expensive. And if you did reintroduce them, you wouldn't know what exactly could happen. Also, if you translocate wild birds from one location to another, you have a serious possibility that they will just relocate back to where they came from. This does not happen so much on small islands, of course, because the island represents a barrier, so they stay where they are. So it really depends on the context.

I think, without any question at all, that zoos have a really important role to play in conservation and biodiversity. This will become more so as time goes on. But it mainly depends on the animal. An animal which breeds very rapidly and has very little inhibitions about breeding in captivity would be a god-send to the conservationists. But that is by no means the universal answer. And this needs to be stressed very strongly to people who may think it is the answer to everything. It is indeed the answer to some things, but not to everything. It can also be absolutely counterproductive.

*I think, without any question at all, that zoos have a really important role to play in conservation and biodiversity. This will become more so as time goes on. But it mainly depends on the animal and on how good the animal's breeding.*

*SD: What about captive breeding in bustards?*

NC: They are not a good species for captive breeding. The captive breeding of the Houbara Bustard in the Gulf, for instance, encountered huge prob-



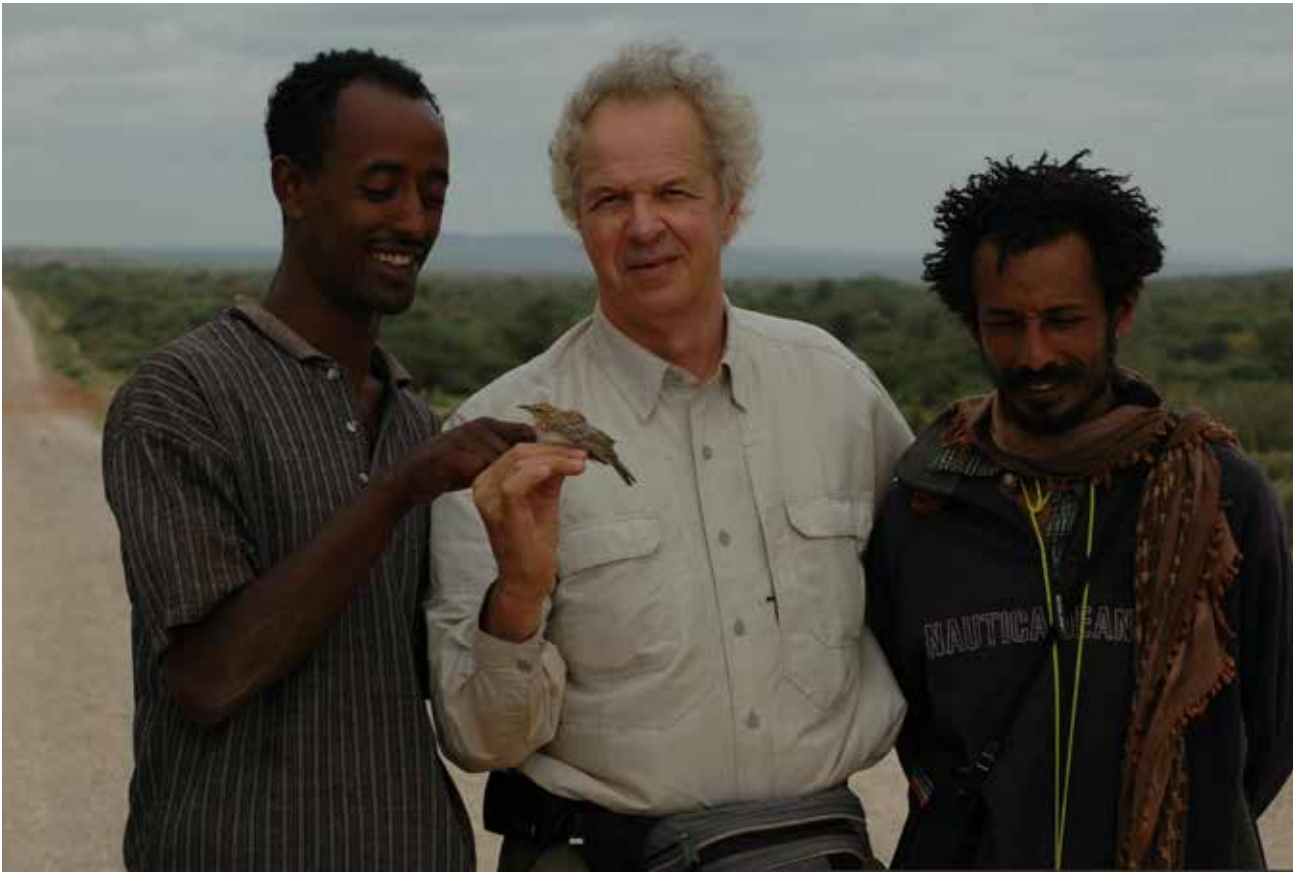
Hell's supervisors—Nigel Collar and Paul Dolman, with whom he has worked for a decade on Bengal Floricans in Cambodia

Hugh Wright

lems for about 15 years. They've finally started to crack it and get the technology that they needed. But progressively over those 15 years, when they finally cracked it, I suspect they were getting an increasingly domesticated form of Houbara. So it's been shown that, after billions of dollars have been invested, Houbaras can now be turned out pretty much like pheasants. This is probably to some extent the result of several generations of weeding out genetically nervous birds, that is, birds nervous in captivity. But nervousness is probably a good quality in the wild. I don't know whether that's true or not, but it's a hypothesis that I have. I don't think anybody has looked to see how similar or different captive-bred Houbaras are now genetically from the wild-caught Houbaras first brought into captivity. So I would be very very wary indeed.

All the evidence of captive breeding that we have got from zoos that have tried to breed other species of bustards, like the Kori, suggests that this has also not been successful. The Smithsonian Zoo in the US can't get these Koris to breed in good numbers. They can just about get them to replace themselves. So they're not actually producing enough to be able to give to other zoos. And there aren't enough to put back into the wild. So it's a real challenge.

Great Indian bustards have hardly ever been bred in captivity while Little Bustards have been bred a little bit. It could be done, but it would require a huge amount of money and a large founder stock. With a highly threatened species like the great



Nigel Collar, Abiy & Merid with Degodi Lark

Claire Spottiswoode





Claire Spottiswoode

Nigel Collar with Degodi Lark, SE Ethiopia

Indian bustard (GIB), you would be taking a huge risk. If you were to capture 20 birds of this species from the wild, my prediction would be that you would have to expect that at least ten of them would die. Could anyone in India face that kind of expense and loss? I don't know whether they could live with that. Those kinds of losses would be, I would imagine, just unacceptable. Even the risk would probably be unacceptable. So the only alternative is to take eggs. But again the number of eggs you need is probably too high for being able to get to the point where you'll have GIBs being bred like Houbaras and being put back into the wild. I think that's just going too far at this stage. Maybe 40 years ago it could have been attempted. But now we are a bit too late. That's my theory. However, I accept other people take a different position.

*SD: How much can satellite tagging tell you about bustards?*

NC: Radio telemetry gives some answers, not all. Satellite telemetry tells you a lot more. But it does require incredible care in handling bustards. I can't emphasize enough how dangerous it is to handle bustards for their sake, not yours. They will collapse with myopathy, they will break their legs and wings. They will simply die on you. So various protocols have to be observed.

From Bengal Floricans that we tagged in Cambodia, we find that breeding males need about 10 square kilometres of grassland. Any smaller than

that, the males are generally not in them. We can identify the kinds of habitats that they like and outside their breeding season they greatly favor open savanna. And this is the habitat which is under the greatest pressure for conversion to cultivation.

We also fitted 63 platform transmitter terminals (PTT) on Houbaras in Uzbekistan and try and follow what they do. We are getting the data back now. One piece of evidence we now have is that captive-bred Houbaras do not survive as well as wild-caught birds. But you need quite a large sample size to draw conclusions correctly.

For instance, I have a student who wanted to study Kori bustard movements in Botswana. There had been reports of their movements there and he thought these were in response to rains. So he put some satellite transmitters on four Kori bustards, and they did not move! They just stayed where they were. It was the most boring result you could possibly imagine. I mean all that effort and a lot of expense, \$2000-3000 per transmitter, and they didn't move. But because it was only a sample of four, we still cannot be certain that these birds were representative, so we still cannot say if the Kori is at least a partial migrant in Botswana.

Similarly tagged bustards that have been released in Britain show an interesting pattern. But it is not a predictable pattern. Except that you can predict that it's going to be unpredictable. Some of them flew in one direction, some flew in the other, and a couple of them flew to France. What is very interesting is that they came back to the area where they were released. It is a good finding. But if you want to know where they might go, it doesn't help you at all.

*SD: What do you think needs to be done immediately?*

NC: From my point of view you've got some grassland reserves, and they haven't worked. What we need to know is why they haven't worked. It is quite possible that you could make them work. What is it that the reserve is not doing that it should do? It may well be that there are things that we haven't really considered. For example, I have been told that the village of Nannaj, just

outside of Nannaj Wildlife Sanctuary in Maharashtra, has a density of 700 dogs per square kilometres. That is a very high predator density. It probably wouldn't affect adult GIBs, but the chances of one dog encountering one chick before it can fly would seem to be very high, wouldn't it? So it's not inconceivable that just dog abundance has a negative influence on the breeding success of the GIBs in these reserves. It may be that in every other respect, those reserves may be perfectly run. Here you have got this artificially high abundance of predators which behave like wild predators but are actually domesticated, derived from an artificial situation where they are being fed in villages. That is completely incompatible with managing wild animals that have to fend for themselves. It is like sending someone into the boxing ring with Mike Tyson, with his hands tied behind his back. He doesn't stand any chance!

So we need to look at what's good, and what's bad about these reserves. Have they got enough grass of the right type? What other species would you manage this for? I'm happy to be corrected, but it seems to me that most of the grassland reserves

in Assam are managed for other grassland species particularly the rhinoceros. And further west they are managed quite heavily for species like the Swamp deer. These animals need grass that is taller than what the Bengal Florican needs. It needs to be a little bit more equitable. You need to have a reasonable amount of habitat for one species and a reasonable amount for the other so that you manage it for both equitably. But you have to accept that the managers of these reserves have got a BIG task on their hands, and you have to be completely sympathetic to them.

The Bengal Florican really needs friends. The way the Cambodian populations are disappearing it is all going to come down to the Indian subcontinent to save it. Here we have now only 400 of them and they are in reserves that are a long way apart.

I think where you can immediately see the problems with the management of reserves of the GIBs, solve them as fast as you can. If the problem has to do with relations with villagers who are hostile for whatever reason that has to be resolved. I think if these things were tackled really thoroughly, there



Claire Spottiswoode

Nigel Collar releasing Sidamo Lark (eye visible under fingers), Ethiopia



would be a good chance that you could stop the GIB numbers from going down. I know that not everyone agrees with that, and I have personally not seen the situation in terms of industrial scale conversion of old traditional farmland to modern farmland. But nonetheless, I think that with enough investment, it could be done. So I would start with reserves and work from there.

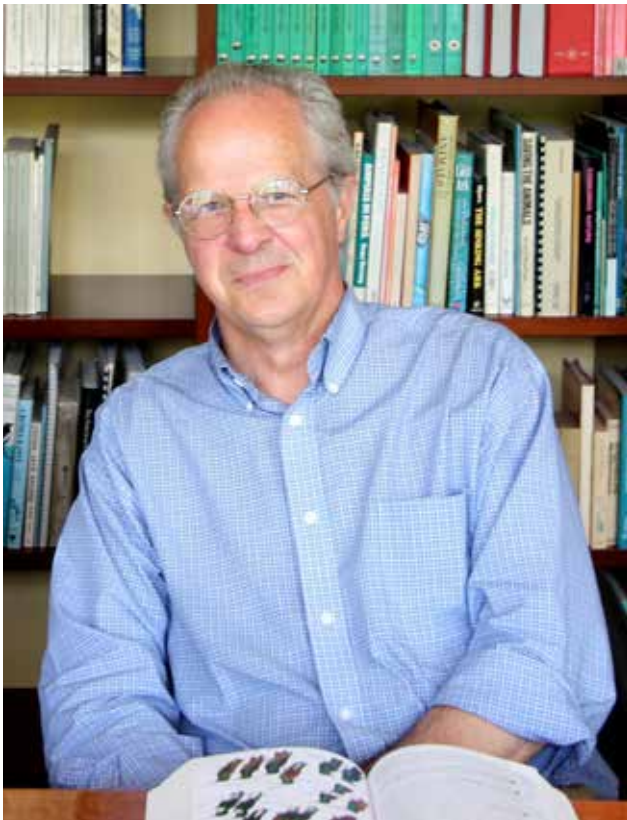
*SD: How do you bring focus to the Bustards?*

NC: Well, they seem to be getting more profile now. Someone did say that bustards are the new tigers. India is a very proud nation. So I'm sure the last thing India wants to do is to lose a species which has the name 'India' in the title. If India loses the GIB, what a horror it would be, don't you think? If it turned out that there was instead a small population in Pakistan, oh my gosh! What would you do then?

There was a case like that in Japan. There's a beautiful species of ibis called the white crested ibis that was first found in Japan and was named after the Japan—*Nipponia nipon*. But it went extinct in Japan and now it is only in China. I don't think the Japanese have ever gotten over the embarrassment.

*SD: Are there examples of success stories where bustard numbers have gone up?*

NC: There's an area in Southern Portugal called Castro Verde. The European Union here provides money for these special protection areas which are not a natural park, but an area of agricultural land where farmers are subsidised to grow certain crops. If they don't get as much market value for those crops as they would if they were farming more intensively, they get paid the difference. So they are perfectly happy. It is an equitable, fair, and reasonable arrangement. The great bustards are also doing extremely well. I actually discovered the area in 1977, and there were around 400 Great Bustards then. Portugal joined the European Union in 1985 and it's been having subsidies over the years. Now the great bustard population in this area is about



Dolors Buxo

1500. It has gone up three times since it was first found. So that's an example where management has improved on the original situation.

I honestly think it can be done, but I think we all agree that it does have to be fair to the local people. The local people have to be part of the solution. Not part of the problem. If you consider them part of the problem, then inevitably it seems to me that you're going to fail.

Indians are incredibly tolerant people and they love wildlife. So you've got a huge advantage there. You just have to win their hearts over and treat them fairly. I think that's a model that could easily work. But it will cost money. But it won't cost as much money as a captive breeding program will cost you.

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# Day out with a herder

Lessons for ecosystem management can be learnt from local communities that have been dependent on a particular landscape for many generations. They care about it since it is their life-line.

The night was dark and lit only by the stars. In July, I was in a small hamlet with Kathal, a Dhangar, who would change my perspective about grasslands forever.

I had met him a few weeks earlier, about 400 km to the west of here, preparing for his long monsoon migration across the Western Ghats from north of Mumbai to Ahmednagar. Kathal and his clan spend most of the year in the west—where private landowners pay them to graze their sheep on their lands for the benefit of the manure the sheep de-

posit. But every monsoon, they make this epic journey and spend a few months here, in the amazing vast grasslands near Ahmednagar, before heading back. The Dhangars are a class of herders primarily located in the Indian state of Maharashtra.

I was there to film wildlife for a BBC documentary-in-the-making. When I had met him earlier Kathal had told me that predators like the wolves and hyaenas would be waiting here for them and their herds to return. He had said that wolves would turn up every night, and I had noted that wisdom





with a pinch of salt. I had come to film the ‘conflict’ between these shepherds and the wolves in this landscape.

But, that night, just as the Dhangars were setting up their beds, they—the wolves—did come. I could see them away in the distance with my thermal camera. They slowly approached the hamlet and the sheep pen, but the dogs chased them away. Almost at the same time, some more dogs were chasing something else at the other end, and it turned out to be a hyena. Both the predators made many attempts all through the night to try and steal the sheep, but the dogs kept them away each time.

The next morning, I apologised to Kathal for not having completely believed him about the presence of predators. I was talking to him about how I see predators and grasslands when he said “Come join me today” and I went along with him as he took off for the day herding his 800 odd sheep.

I was scanning for wildlife with my binoculars and trying my best to avoid stepping on all the sheep droppings while he was talking. I asked him what he felt about the wildlife in the area.

“People think we just hang around with the sheep all day and have nothing to do with the land. We are blamed for overgrazing the land and taking away resources from wildlife.” he said.

“Time is more important than numbers..” he continued, staring into the horizon. “Overgrazing of grass is directly related to the amount of time the plants are grazed by the animals and how often we come back to the same place. This is what I do. As long as my sheep are on the move and do not come back to the same place often, it stimulates good grass growth. The forest department burns the grass for fresh shoots. Why don’t they just let our sheep graze? Sheep do the exact same thing and it benefits everybody”.

“This is why you have the predators here. They keep the wild ungulates (blackbucks) on the move all the time and in the process keep the grasslands healthy. My ancestors observed this and have developed these herding practices. On what basis do you stop us from grazing?”

I realised that although I was just a filmmaker, for Kathal, I represented the larger wildlife/conservation community that has denied them grazing rights across large parts of the country.

We chatted the rest of the day about his animals. He looked after each of the 800 odd sheep as if they were his own children, observing which one was limping, which one did not eat well, which one was fighting with whom, etc. After we got back in the evening, he and his son spent an hour or so singeing the hooves of all the animals he had noticed limping during the day, and he also force-fed atta to the sheep that had not eaten during the day.

*“Time is more important than numbers..” he continued, staring into the horizon. “Overgrazing of grass is directly related to the amount of time the plants are grazed by the animals and how often we come back to the same place. This is what I do. As long as my sheep are on the move and do not come back to the same place often, it stimulates good grass growth. The forest department burns the grass for fresh shoots. Why don’t they just let our sheep graze? Sheep do the exact same thing and it benefits everybody”.*

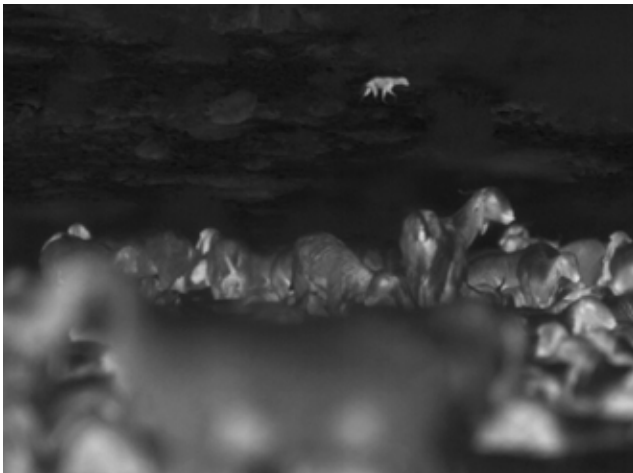




That night, as I was sitting on my camp stool with the thermal camera, I was thinking about the day and all the things Kathal had mentioned. It all made sense. In fact, there have been studies from Africa and even in India (in places like Bharatpur), where a positive correlation has been demonstrated between the health of the grasslands and grazing. Probably species like the great Indian bustards are now disappearing because of the changes in the grassland communities after cessation of grazing due to the ‘protected’ status given to them.

That night the wolves were back again, and at around 3 am, when all the dogs were fast asleep, one of the wolves slowly sneaked in, cut the rope that was holding the nets and picked up a lamb and fled. The dogs woke up to the commotion and then everyone realised what had just happened. I was sitting and filming these series of events. Far from the hamlet, the wolf was joined by 2 more and together they finished off the kill.

I spent two weeks with Kathal and every day I learnt something new. Not just about animal husbandry, but also about grasslands and the close relationship between them (the grazers) and the grasslands.



On the last day, I was interviewing him on camera and asked him if he saw wolves as a threat. He said “Of course not. We budget for these losses. Our biggest threat is the forest department and wildlife people like you who build fences and block our grazing routes.”

I, for once, totally agreed with him. Even in that short period of time, I was witness to “afforestation” of these grasslands. It was evident that the grasslands were not even recognised as a unique ecosystem by the very department that was meant to protect and maintain them.



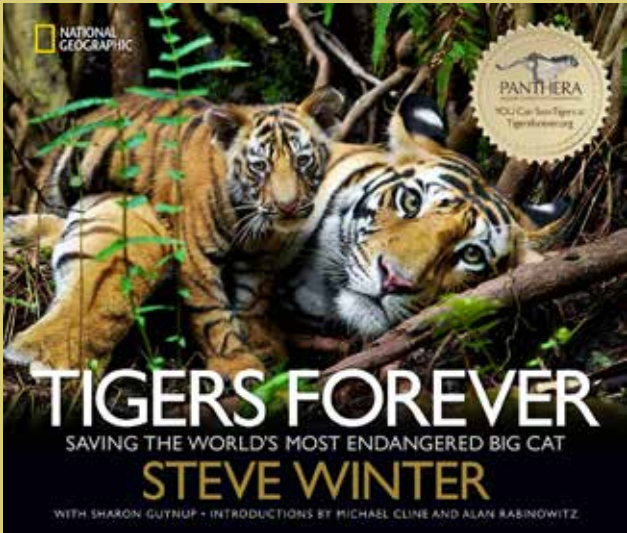
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Every inch of land that did not have a tree was being viewed as a ‘wasteland’. All this, despite seeing species like the blackbuck, bustards, foxes, and others being specifically dependent on these ecosystems. And without taking into account the fact that grazers and these grassland-dependent species have co-existed for centuries until the Protected Area system came into being, among other changes, and altered the dynamics of these landscapes.

*Kalyan Varma is a wildlife photographer and filmmaker from Bangalore, India. He freelances with BBC Natural History and National Geographic Channel (India), and also works with grassroots NGOs to highlight environmental issues in India. kalyan@rtns.org.*



# Cats in crisis



## AN INTIMATE PORTRAIT OF THE WORLD’S LARGEST FELINE AND CONSERVATIONISTS’ DESPERATE ATTEMPTS TO SAVE IT

Even for the most eco-conscious among us, it is surprisingly easy to become immune to pleas for assistance with conservation causes. We see so many, for species of all shapes and sizes, that the messages begin to lose their power. Particularly susceptible to this ‘dilution effect’ are charismatic megafauna, whose images have long been used not just for species-specific campaigns, but also those targeting whole ecosystems.

A prime example is the tiger (*Panthera tigris*), the subject of a new book called *Tigers Forever*. Authored by Steve Winter and Sharon Guynup, and published jointly by National Geographic and Panthera, the volume seems, at first glance, to be yet another ‘coffee table’ book that will offer lovely images but not much else. However, this misconception is quickly dispelled.

In their forewords, conservationists J Michal Cline and Alan Rabinowitz admit that tiger conservation has been “a spectacular failure”, and that “the tiger is in desperate straits.” These ideas are further explored in the introduction, where George Schaller provides some of the depressing statistics associated with the ongoing decline of *Panthera tigris* throughout its range.

However, the authors of *Tigers Forever* clearly do not feel that the tiger’s permanent disappearance is inevitable. The overwhelming message of the book is that conditions are dire, but can be improved—though this needs to happen soon or the cause will be lost. There is, therefore, an urgency to the tone of the book, which makes it all the more compelling. Each chapter looks at a different tiger habitat—Myanmar, India, Sumatra, Thailand—and investigates both the threats that resident tigers face, and the efforts being made to protect the animals.

One strength of the book is its unflinchingly accurate descriptions of unsavory things such as widespread habitat destruction and brutal poaching events. Another is its focus not just on tigers, but also the human element. Each chapter contains at least two sidebars featuring short biographies of the biologists, veterinarians, and environmentalists who have devoted their lives to ensuring the longevity of the tiger. Particularly striking are the portraits of the guards who literally risk life and limb to preserve these endangered cats. Many are away from their families for months at a time, living in remote areas with few amenities—all to protect an animal that may injure or kill them at any time.

Probably the greatest strength of the book, though, is its photographs; after all, the author’s day job is photographing wildlife for National Geographic. His photos have been painstakingly collected over the course of several years, and offer views of tigers that readers may not have previously seen. This was partly made possible by Winter’s use of camera traps as well as handheld cameras; the resulting images provide an up-close-and-personal introduction to the life of a tiger. In addition to the obligate images of cute cubs, there are also photographs of tigers engaged in everyday activi-

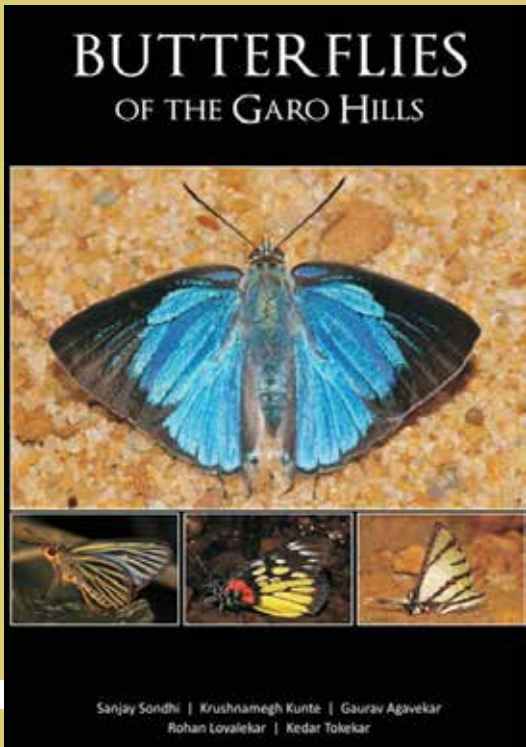
ties such as hunting, stretching, fighting, bathing, frolicking with littermates, and interacting with humans (for better or worse). There are even images that show no tigers at all, but instead capture the habitat in which these animals live, and the threats they face there. The only drawback to the quality of the photos is that it is not always matched by the quality of the text. Most of the time, however, the reader is too immersed in the world of the tiger to even notice this disparity.

“Tigers forever” is not just the title of the book, but also the name of a conservation initiative—and, of course, an expression of hope. It is an appropriate appellation for a book that manages to show new sides to such a well-known species, and to renew the reader’s interest in this endangered cat. As Alan Rabinowitz says in the epilogue, “the core model and talent are in place” to save the tiger. Sales of *Tigers Forever* will help raise some of the financial capital needed “to rapidly and extensively scale up” conservation initiatives. For that reason alone, the book is well worth purchasing.

*Caitlin Kight is an editor, writer, and educator affiliated with the University of Exeter’s Penryn Campus, UK, [caitlin.r.kight@gmail.com](mailto:caitlin.r.kight@gmail.com), <http://www.caitlinkight.com>.*



# Garro Hills butterflies



## Butterflies of the Garo Hills

Sondhi S, K Kunte, G Agavekar, R Lovalekar & K Tokekar

Samrakshan Trust (New Delhi), Titli Trust (Dehradun) and Indian Foundation for Butterflies (Bengaluru). 2013

### THE FIRST PICTORIAL GUIDE TO THE BUTTERFLIES OF THE GARO HILLS, MEGHALAYA

India is a country blessed with a breathtaking diversity of lifeforms, including that of charismatic groups such as birds, butterflies and large mammals. The allure of these groups among the general populace has been harnessed in conservation efforts the world over. Butterflies are one of the few invertebrate groups that can fascinate and appeal to anyone. Butterfly-watching in India is handicapped by the absence of good regional field identification guides. A nature enthusiast is able to readily identify a common bird in any part of India, thanks to the several beautiful field guides available, many of them with stunning photographs. Indeed field guides for birds have been a vital catalyst in promoting bird-watching. Butterflies are usually more conspicuous and easily-spotted than are birds, yet a nature lover in Northeastern India may find it hard to identify even the common butterflies. Currently the only useful book is Isaac Kehimkar's '*Butterflies of India*', in itself a landmark publication, being the first illustrated book put together after India's Independence to cover butterflies of the entire country. However, field guides covering particular regions are typically more useful to a visitor. Such books provide more relevant information about the particular area. Only the species occurring in the area of interest are represented, rather than an exhaustive country wide list. This is especially relevant in the case of highly speciose groups such as butterflies.

'*Butterflies of the Garo Hills*' is a refreshingly beautiful piece of work that will prove to be an important publication. It covers butterflies from the Garo Hills in Meghalaya, which is part of the Indo-Burma biodiversity hotspot. It will provide a vital boost to the eco-tourism activities in the area and help conservation efforts in this critical habitat. Butterfly-watching has immense untapped potential and can become just as popular as bird-watching. This book will certainly help to popularise butterfly-watching among visitors to the area

and locals alike. This will likely also have a spill-over effect by attracting more butterfly watchers to other parts of Northeastern India. The success of the book will also surely encourage similar ventures in other parts of India.

The book is largely based on surveys undertaken by the authors between 2008 and 2011, data from which were presented in the paper Kunte *et al* (2012). The paper was a commendable piece of work, being one of the few systematic surveys of butterflies in any locality of Northeastern India post-Independence. There were several rare species recorded in these surveys. Although the 320 species cover only a fraction of the expected diversity in the region, this list should include almost all species that a keen butterfly watcher is likely to spot on a visit.

All species are illustrated with at least one crisp photograph. A large number have both the upper and under sides illustrated, and many species where the sexes differ markedly also have photographs of both sexes. I was especially happy to see photographs of museum samples for some *Mycalesis* (bushbrowns) along with the field photographs. More museum photographs would have helped the book appreciably. As it is, the authors have made a good effort to include photographs for each species to represent the most common within-species variations, including that of seasonal morphs.

In addition to english names, all species have their scientific names including the subspecies wherever applicable. Each species has a brief description that includes characters that can be used to identify it. This is followed by a list of similar looking

species, habits and habitats. The distribution of each species within India is also mentioned along with the most likely months and localities where the species might be spotted in the Garo Hills. The book also includes maps and other information of the area that should prove very useful to a visitor. The layout of the text and photographs is elegant, and I found the book a pleasure to go through.

My main criticism is that the authors could have continued surveying the area for a longer period after the Kunte et al (2012) paper was published before attempting to put together this book. With more survey data, the authors could have covered many more species. Moreover, butterfly diversity and abundances in the same locality can fluctuate greatly over years. The abundance data collected in sporadic surveys during the course of less than 4 years may not necessarily predict what a visitor will spot. Nevertheless, this is an excellent effort for the first version of the book and I look forward to seeing updated versions in future

For now, I can easily recommend this book to any butterfly enthusiast visiting not only the Garo Hills, but other parts of Northeastern India. It is priced reasonably at Rs 500, and the authors promise that the profits will reach the local community. This publication model is laudable and will do much for local community-based conservation efforts in the region.

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