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editor's note



Cover art **Barkha Lohia**

The authors' column of the third Current Conservation issue brings me particular joy. In a lot of ways, both intention and serendipity merged to bring 14.3, an issue both run by women and bringing you stories by women (with the exception of our regular column by Kartel Shockington, who are happy to be read in esteemed company).

Sonya Sankaran and Manju Vasudevan make room for conserving indigenous food ways, while Deborah Dutta and Adithi Muralidhar talk natural world in unnatural environments – our cities. Saloni Bhatia takes you far away from both, all the way to Ladakh. In continuation with our focus on environmental policy in 2020, Rinki Sarkar talks avian roles in forest conservation up in the Himalayan mountains. Our two Research in Translation pieces in this issue offer insights into research on a) legality of wildlife corridors around certain water bodies, and b) marine protection covers leading to loss of biodiversity.

This issue also features a lovely photo essay on taxidermy, thanks to Manisha Kumari. The CC team hosted a phenomenally successful #CCInktober this year. Our Art Editor walks us through the winning entries. In this issue, I had the honour of publishing a poem about my adventures at the Kilpisjärvi Biological Station. I hope reading our work feels just as adventurous.

—**Shruti Sunderraman**

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On a wild food trail

Author **Manju Vasudevan Sharma** | Illustrator **Sonya Sankaran**

Anapantham is a name familiar to those who have done the trek from Parambikulam National Park in Kerala, India, down into the western valley following the historic Cochin Tramway, an engineering marvel built during the British times. Historically, these forests along the western face of the Anamalais were called Cochin State Forests and were heavily exploited for timber. The indigenous Kadar people, for whom these forests and rivers are part of the ancestral domain, were in fact hired by the British for a range of plantation and other developmental activities in the region, the Tramway construction being one of them.

Following a landslide in 2002, the Kadar folk of Anapantham were rehabilitated to a settlement called Shastampooam on the edge of a degraded forest. Life in the upper catchment of Karuvannur river, for the Kadar, is sustained by the forest they were born into. Men, women and children in this new settlement go in search of honey, resin, medicinal plants and wild food. In the olden days, they may have traded and bartered with people in the plains for forest produce. All of the summer months are spent traversing the mountains, and most honey and resin is harvested before the monsoon intensifies. The produce is sold to the Forest Development Agency based on fair prices and a profit sharing mechanism.

It is a cloudy morning in early July. Chandrika and Shaju are headed into a patch of forest close to their home to gather fruits of the Eendh tree, called Queen Sago in English and *Cycas circinalis* in Latin. I am out with them on a photo documentation of non-conventional non-timber forest products (NTFPs), as part of the community enterprise building carried out by the Conservation and Livelihoods Team of River Research Centre in Kerala. Their two dogs zig zag across the trail, run back and forth, making sure they keep an eye out for anything dangerous. I remark on how the path is overgrown and looks unused, and Chandrika quips, “No terrain in the wild is unfamiliar for us; we wouldn’t get lost even in the dark.”



The Cycad is a gymnosperm from Jurassic times, and is endemic to the Western Ghats. The trunk bears permanent leaf scars, and the leaves resemble palm leaves. Across the Western Ghats the species is subject to heavy harvest pressures from exploitative commercial trade of seeds, male cone, leaf and pith. The fruits are toxic to wildlife, so the natives of Anapantham know there are no competitors and always plenty for people. Queen Sago is a staple food in the traditional diet of indigenous communities, quite a favourite delicacy among the Kadar people, often favoured over rice.

Apparently it is only the fruits that are not sought after by wild creatures! The leaves of *Cycas cirinalis* are host to the mellow looking Plains Cupid butterfly. The larvae secrete a sugary liquid with amino acids. Ants living on the Cycad feed off this secretion, and in turn protect the larvae from predators. One is intrigued how ancient this association might be...were the Plains Cupid butterflies in search of this Cycad even during the Jurassic times?!

For now, Chandrika and Shaju are out to find an adult Cycad, and we have crossed two perennial streams. Once we get to an adult with profuse fruiting, the harvest is rather quick. Shaju climbs on the crocodile-like scaly bark of the trunk and plucks off bunches of fruits. The collection is bundled up in a dhoti (a large piece of cloth - like a sarong - traditionally worn by men) and carried back to their home on the edge of the forest.

Preparing Eendh to eat is labour intensive. After removing the fruit's hard shell, the seeds are halved and left to dry over a woodstove for a couple of days. They are then tied in a jute sack and immersed in flowing water in a stream for 5-7 days to get rid of the toxin, cycacin. For this leaching process one must choose a stream that is not populated with crabs for they can come and nibble on the seeds right through the sack.

One final step of drying over the woodstove, and then the seeds are ready to be cooked and eaten with meat. Well dried, smoked seeds can be saved for more than three years. Sometimes they are stored in powder form to make a porridge, or a jaggery and coconut based delicacy!

Today, Queen Sago is eaten far less than in earlier times, either because it is considered less sophisticated than mainstream food or because harvest and treatment is an arduous task. By reviving some of these food ways and finding niche markets for wild food it might be possible to not only secure indigenous livelihoods but also keep alive the knowledge of local resources and their ecology and distribution. Through establishing a relationship with harvesters, the effort is to inculcate sustainable harvest protocol for NTFPs and practices that help

Dr Manju Vasudevan Sharma is a pollination ecologist who currently works on building NTFP-based enterprises with indigenous women, as a means to help assert community forest rights.

protect species such as *Cycas circinalis* in the long run. The project hopes to demonstrate that it is possible for native communities to take on conservation stewardship roles and use forest rights in meaningful ways, alongside conserving ethnobotanical knowledge.

Further reading:

Krishnamurthy V., L. Mandle, T. Ticktin, R. Ganesan, C.S. Saneesh and A. Varghese. 2013. Conservation status and effects of harvest on an endemic multi-purpose cycad, *Cycas circinalis* L., Western Ghats, India. *Tropical Ecology* 54(3): 309-320.

L.W. Wu. 2010. Elucidating origins of the Cycad Blue (*Chilades pandava*): a threat to cycad plants worldwide, with a discussion on the evolution of *Cycas* feeding behavior. PhD thesis. National Taiwan Normal University, Taipei, Taiwan.

Ramakrishnan, V. 2020. Conservation through private initiative: A case study in the Western Ghats, India. <https://www.iucn.org/news/commission-environmental-economic-and-social-policy/202003/conservation-through-private-initiative-a-case-study-western-ghats-india>.



Sonya Sankaran's work as an artist, ecologist, and educator connects people to art and nature as a means to improve human and environmental health.



From moong to mongoose: Exploring nature in cities

Author **Deborah Dutta and Adithi Muralidhar** | Illustrator **Aashti Miller**

Weekend getaways to refresh oneself in the lap of nature have become an increasingly common occurrence. However, what if one were told that cities are, in fact, teeming with diverse life forms if we ever stopped to notice? What if the simple act of growing edible food in small pockets around the city could become tiny hotspots of wilderness? Rather than seeing nature as something separate from human habitation, what does it mean to understand and appreciate the ecosystems existing in cities? We reflect on these questions through our own experience of urban farming and attentive walks around the city of Mumbai.

If you look at it long enough, there is a strangely hypnotic quality to a spider's web. We have spent countless moments mesmerised by the poise of a signature spider, as if deep in meditation. Its uniquely patterned web glistens in the sunlight like fine threads of silver. The trance is broken soon enough by the emphatic alarm call of the tailorbird that is fiercely guarding its nest in a nearby balcony. Tailorbirds, though tiny, produce loud calls that are heard all over the city. We were amused to see something that small being so loud. And there are many others like the tailor bird, who may be small and "insignificant"-looking, but their presence is felt through the many signs they leave for us in the form of songs, feathers and nests.



Contrary to popular belief, cities nurture much more than human life, and can do even better with a little participation from our side. Often, the simplest way to make space for nature in cities is by observing it. This has proven to be true in several ways during the lockdown period, as people find themselves paying attention to spaces that often go unnoticed. The black kite that usually soars up high in the skies is seen relishing an assortment of prey with each passing day, ranging from rats to lizards, birds and fish! With all kinds of wilderness encounters across different cities featuring in the news, the promise and possibilities of urban biodiversity hide in plain sight.

Right before the lockdown, we were caught off-guard at the sight of a young jackal foraging near some trees in suburban Mumbai. It was difficult to say who was getting more attention, us or the jackal, for both spent several minutes following the other, until the jackal finally decided to disappear amongst the thickets. Our non-human companions give us company, even if we do not notice them most of the time; like the rose-ringed parakeet who secretly munches on all the guava fruits on our institute campus on the hottest of afternoons.

One of our favourite evening walk routes goes through a now largely abandoned residential area in the city. Apart from a group of wild pigs and dogs, the area is home to coppersmith barbets, Tickell's blue flycatchers, Indian silverbills, common ioras, scaly breasted munias, ashy and plain prinias! Once, we spotted a spectacled cobra lazily cross a road and enter a garbage dump, perhaps having made a quick meal of another snake or a rat. In fact, once your senses are attuned to picking up signs in the environment, it is incredible how much a simple morning or evening walk can reveal!

Not just a concrete jungle

Apart from passive observations, it brings us no small measure of joy to witness things growing. Growing edible plants is a uniquely rewarding activity as one gets to experience various connections involved in the journey of food. Pay close attention, and the soil comes alive with hundreds of critters engaged in constant action. A million more are not even visible to the naked eye. We never knew how beautiful okra flowers look, or how the Amaranth plant yields thousands of small, round, shiny black seeds. Digging for tubers felt no less exciting than a treasure hunt, and the resilience of an ash gourd vine that had endured the trauma of being trampled upon as a sapling surprised us no end. It eventually bore over 10 ash gourds weighing between seven and 18 kg!

As the plants have grown in a tiny corner of the academic campus, relationships have become more apparent too. Ants can be seen stroking the underbellies of aphids to stimulate the secretion of plant sap that the aphids feed on. Plants are not silent spectators either. We always wondered how ladybirds would invariably be seen on plants that had too many aphids on them. Numerous studies now show that plants release volatile compounds that attract predators of the pest, and can also warn neighbouring plants! There is much that goes on beyond our sensory perception, but close attention can allow us to appreciate things that we would otherwise miss.

Termites seem busy at work, decomposing layers of organic mulch almost as fast as we can add it. We often spot the common Mormon butterfly hovering around the curry leaf plant to lay eggs.



A wasp quickly catches a leaf miner and flies away, before it becomes a meal itself for the ever-watchful bee-eater. The orb-spider patiently waits for a grub to get caught in its web. A family of mongoose stick their heads out of a burrow, perhaps as curious about us as we are about them. We play a staring game with them being absolutely still and rejoicing quietly when we win. Winning here essentially means the mongoose are no longer wary of our presence and go about their daily activities ignoring us. We make peace with the monkeys who have developed a taste for our brinjals and cabbages. We are thankful that they usually leave our beloved tomatoes alone! After all, we are newer occupants of the land that they had inhabited long before us. We rarely encounter snakes on the farm, but they let us know of their presence through several feet of (shed) snakeskin lying close to the rough surface of the building wall. The web of relations continues to grow.

Rewilding our cities

There is an old mango tree in our neighbourhood. Apart from its majestic canopy, it is well known as the roosting site of hundreds of black-headed ibis, night herons, glossy ibis, and cattle egrets! The timing of the ibis is impeccable. They arrive in flocks of 10–15 from nearby wetlands and circle around their favourite tree. They soon settle on the tree, occasionally fighting off crows or black kites. It is a mystery how and why they choose those particular trees. Some explanation might exist somewhere, but it won't do justice to the sheer experience of watching these beautiful birds gathering around the tree at dusk, as if it were calling them to rest for the night.

There is no dearth of life even in what we may consider the filthiest of habitats in the city. Amidst the murky waters of the sewers and gutters we find between railway tracks, we see tiny frogs popping their heads out. In garbage dumps, we find the opportunistic cattle egrets scavenging along with the crows. And in wetlands that are greasy with oil and cluttered with trash, we find waders filtering the food from the rubbish. Some of these areas are invariably flecked with pink as they become the wintering grounds for many lesser and greater flamingos. The migrant populations of birds visiting the city time and again give us hope that we can, perhaps, share this space with them. Even in the darkest corner of a building, an owl moth mesmerize us with its psychedelic patterns.

However, we must recognise that we can't take their companionship for granted. As in any relationship, this needs some work from our side. We can actively create habitats that allow diverse species to flourish, even as our hearts and minds expand through such efforts. From balcony gardens to terrace farms, river banks to wetlands, every ecological niche makes a difference. Distant hills and forests are undoubtedly alluring places, but cities need not be bereft of wonder either. In rewilding the spaces in our city, we might find the humanity that is often missing in it.

Deborah Dutta is a Senior Research Fellow at the Institute of Rural Management, Anand. She works on developing community-based sustainable initiatives, STS issues and agroecology.

Adithi Muralidhar works at the Homi Bhabha Centre for Science Education, TIFR. She is a nature enthusiast and has a keen interest in the dynamics of society and the environment.

Aashti Miller is an architect and illustrator. She is the sole force behind MillerInk, a graphic design and illustration studio. She 'constructs' her drawings in an attempt to unite her two seemingly disparate worlds.



Ladakhi chai pe charcha: Lost stories from the high mountains

Author **Saloni Bhatia** | Illustrator **Sana Bansal**

"Tell me a story about the wolf, mémé lé?"

I request the old man sitting next to me in the Ladakhi rebo (traditional yak hair tent) as I sip on the delicious butter tea to soothe my rumbling stomach.

"I recall a story about a wolf and three goats," he says. "A lone wolf encounters the first goat and asks her, 'What is on top of your head?'"

The goat answers, 'These are my horns.'

Then the wolf asks, 'What is it that covers your body?'"

'My wool'

'What is it on your feet?'"

'My hooves.'

Unsatisfied with the answers, the wolf eats the goat. He moves to the second goat, who answers similarly. She, too, meets the same fate. Finally, the wolf faces the last and youngest goat. Ready for his third meal, the wolf asks the youngest goat, 'What is on top of your head?'"

'A knife to kill you,' she says.

'What covers your body?'"

'A rope to tie you.'

'What covers your feet?'"

'My hooves to kick you.'

And with that, the goat pierces her horns into the wolf, binds him with her wool, and kicks him with her hooves, which eventually leads to his death," concludes the old man.

I am not sure how to respond to this story, but I accept the laughter that pervades the room, smiling



tenuously. The anthropologist in me is fighting the conservationist. I am here to record folklore around wildlife for my doctoral research. Folk stories, some argue, are a way for people to make sense of their world by transferring moral qualities to the animal or the 'more-than-human' world, as some anthropologists refer to it. Anthropomorphising, that is assigning human emotions to animals, serves as a tool to affirm social norms and behaviours.

I find the wolf story insightful in that it demonstrates how the predator is perceived by the Ladakhi people. I wonder if it is a parable about how some humans conceptualise power, and its subversion by the underdogs ('undergoats' in this case). Perhaps it is an example about the thin line between justice and revenge.

When I first encountered the cold deserts of Ladakh in 2013, I questioned my concept of space, mountains, and time. I had previously worked in rainforests, grasslands, agricultural, and urban spaces, but never had I ventured into a landscape so stark and naked, as though the cloak of vegetation had been stripped off abruptly. One must really like nothingness to be able to appreciate a place like this.

High altitudes, that is areas above 3,500 metres in the Western Himalaya, are a world of their own. They are not as remote and disconnected as one would imagine faraway places to be. Instead, they are alive and interconnected through networks — both ecologically and culturally — difficult even for the technologically-savvy to imagine.

Ladakh, for instance, played an important role in the days of the Silk Route trade, which provided people an opportunity to barter for essential as well as luxury items from Central Asia, Tibet, and Mongolia. Even today, it is a place where unpredictability is complemented with ingenuity; the harshness of the landscape is complemented with cooperation, and challenges are complemented with resilience. There are no guarantees about the weather, the high passes, the road, or the mode of transport, but there is usually a way around these even at the most hopeless of times.

Over the six years that I did my research here, I learnt how to work on faith, rely on instinct, and most importantly, memorise a few basic rules — sometimes the hard way. No car? Hitch a ride. No ride? Walk. Snowing? Keep walking. If indoors, have *cha* (as the Ladakhis called *chai*). Roads closed?

Have more *cha*. Cannot leave? Make conversation. What did my research involve? Conversations. My world revolved around *cha* accompanied by endless chats.

Our conversations touched upon a range of topics from local inventions, such as the potential for agriculture at impossible altitudes, or ice stupas to conserve water, to communal and caste politics; to the state of education in government schools, to wildlife, to culture, to agents of social change. *Cha* being the sole constant. Cups of *cha* eventually gave way to endless glasses of *chaang* (fermented barley) as conversations deepened or lightened up, depending on how one looks at inebriation. They would last for hours, during which time long-forgotten folk songs and gory tales of adventure, hunts and battles were narrated animatedly. Like the conversation I had with *mémé lé* in the summer of 2016.

Or the lines that an *apo* from Kargil (*apo*=grandfather), who was very dear to me, recites while his wife showcases a handmade vintage hookah made of argali horns. The song is about the transitory nature of life, conveyed through references to two predominant carnivores, the snow leopard, and the wolf:

***"You are a sly creature, you hide between the rocks to kill your prey,
But when you grow old, your cleverness will be of no use.
The top of the mountain is inhabited by an arrogant wolf,
But when it grows old it will not be able to kill a single lamb."***

During the research, we managed to unearth and record many stories, songs, anecdotes, and proverbs, revolving around wild animals from choughs to gazelles to snow leopards. The work involved





hundreds of conversations/ interviews, countless visits to libraries, relentless pursuit of suitable (and interested) transcribers who could help us translate the stories from Ladakhi to Hindi/English. Naturally, our efforts were punctuated frequently with *solja* — an honorific reference to tea in Ladakhi.

What is the relevance of such an exercise to conservation, one may ask? The logic is simple — one cannot expect to ‘conserve’ without a clear understanding of the values, motivations, and perceptions of the local inhabitants, people and wildlife included. Indeed, conservation is as much about people as it is about wild animals.

Over another cup of *cha* and some more cajoling, a reticent *api lé* (*api*=grandmother), a proud *Shamma* (inhabitant of western part of Leh), sings a beautiful folk song about the ibex’s ‘magnificent brown horns, teeth shining white like a conch’. And another about how the horns of a blue sheep when seen from atop a mountain ‘make all carnivores happy’. I remind myself that I need to be a neutral observer, but this delicate, nuanced observation overwhelms me. I can picture these wild ungulates peacefully munching on grass as evening descends and a young snow leopard stalking its prey, heart in its mouth.

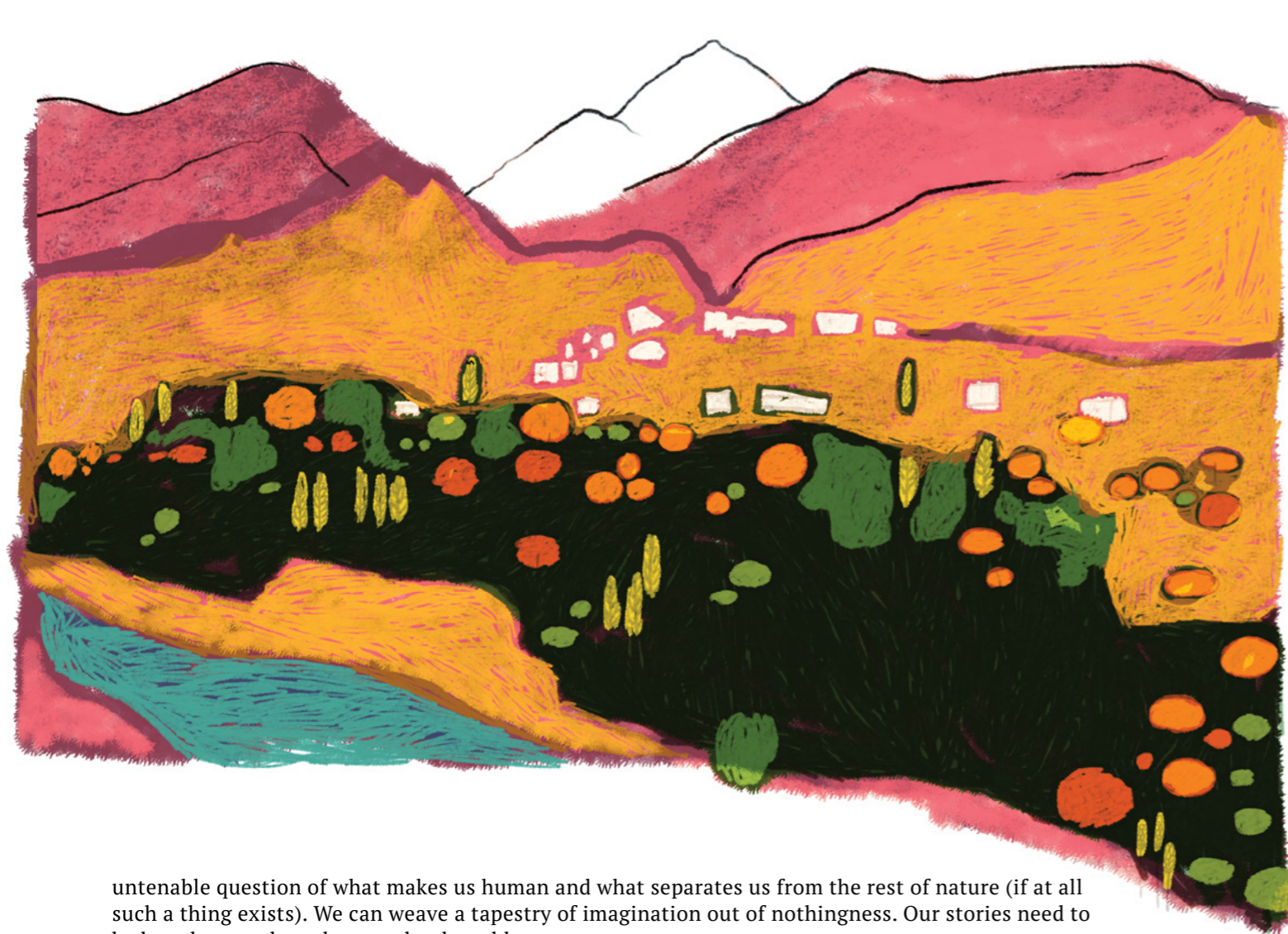
I look around *api lé*’s summer shack. There are yarns of sheep wool hanging on nails, an assortment of brass ladles and the claw of a bird of prey, most likely an eagle. I am told it is a good luck charm. “So, some wild animals bring luck?”, I ask naively. “Yes, sighting a fox at the start of the journey is considered good luck by many,” says *api lé*. “By extension, some others bring bad luck then?” “Yes,” she says, “In many villages in Kargil, people believe that if blue sheep and ibex come down to the village from the mountains, then one can expect a natural catastrophe, for example, floods. It happened in 2013. Have some more butter tea, *nomo lé*.” (*nomo*=daughter)

“Calamities in the village.... happen when the *lha* [deity] is upset?” I remember asking *ajhang lé* (*ajhang*=uncle), a local schoolteacher, about a week before. “Yes,” he said, “when the village or an individual angers the deities, especially the temperamental ones, they can take the form of wild animals like the snow leopard or wolf, and attack livestock.” “How does one rectify it?” I ask. “Pray. Ask for forgiveness. Make a peace offering.” Things that people are expected to do to placate those they may have hurt.

I ponder over the complexities of our relationship with what we call the ‘wild’. Do we anthropomorphise animals or animalise humans? Perhaps the dichotomy is arbitrary or even superficial. In a world where animals can have ‘human-like qualities’ and humans can have ‘animal-like qualities’, this question is moot. Take for instance, *Kinnara* and *Kinnari* — half-human and half-bird deities in Tibetan Buddhism, one of the two predominant religions in Ladakh (with the other being Islam) — that are believed to protect humans.

The worldview we share about wild animals and wild spaces affects their existence and survival (and ours). For instance, a wolf is typically associated with qualities like greed, slyness, stupidity, and trouble. Such cultural biases against the carnivore can fuel much resentment and sometimes retaliation, especially when they prey on people’s livestock. How then, must one frame conservation messages that resonate with people, whilst also enabling them to minimise their losses?

To me, the answer can be arrived at by listening to and appreciating all the divergent perspectives on animals and their potential/ preferred fate. We have innumerable ways of responding to the



untenable question of what makes us human and what separates us from the rest of nature (if at all such a thing exists). We can weave a tapestry of imagination out of nothingness. Our stories need to be heard as much as they need to be told.

As I sip my *cha* several thousand kilometres away from Ladakh, I think about life in the cold desert. I realise that Ladakhi people's resilience and ingenuity is mirrored in their culture. I think about what got me interested in this seemingly barren landscape. Nothingness. It was nothingness. Once the initial discomfort faded, it offered me the rare privilege to understand that what I perceived as 'nothingness' was akin to *béyul* (mythical and magical hidden land), which was pulsating with stories, imaginations and experiences that were waiting to be unpacked.

The journey is still ongoing, with documentation being the first step. Moving forward, I hope that the stories can be incorporated not only into conservation, but also reach the youth, who are the ultimate torchbearers for this landscape.

Meanwhile, locked down in Bombay, I reminisce about the savoury butter tea, almost feeling the soupy flavour on my tongue. I go into the kitchen to make a strong cup of *adrak chai*, a close second to *solja khante* (butter tea).

Saloni Bhatia spends most of her time either working in or dreaming about the Himalaya. She hopes to eventually build a cozy little nest for herself and her pets amid the snowy mountains.

Sana Bansal is an illustrator and visual designer, who draws odd humans, odd animals and everything in between. Her work is often influenced by folktales and magic realism.

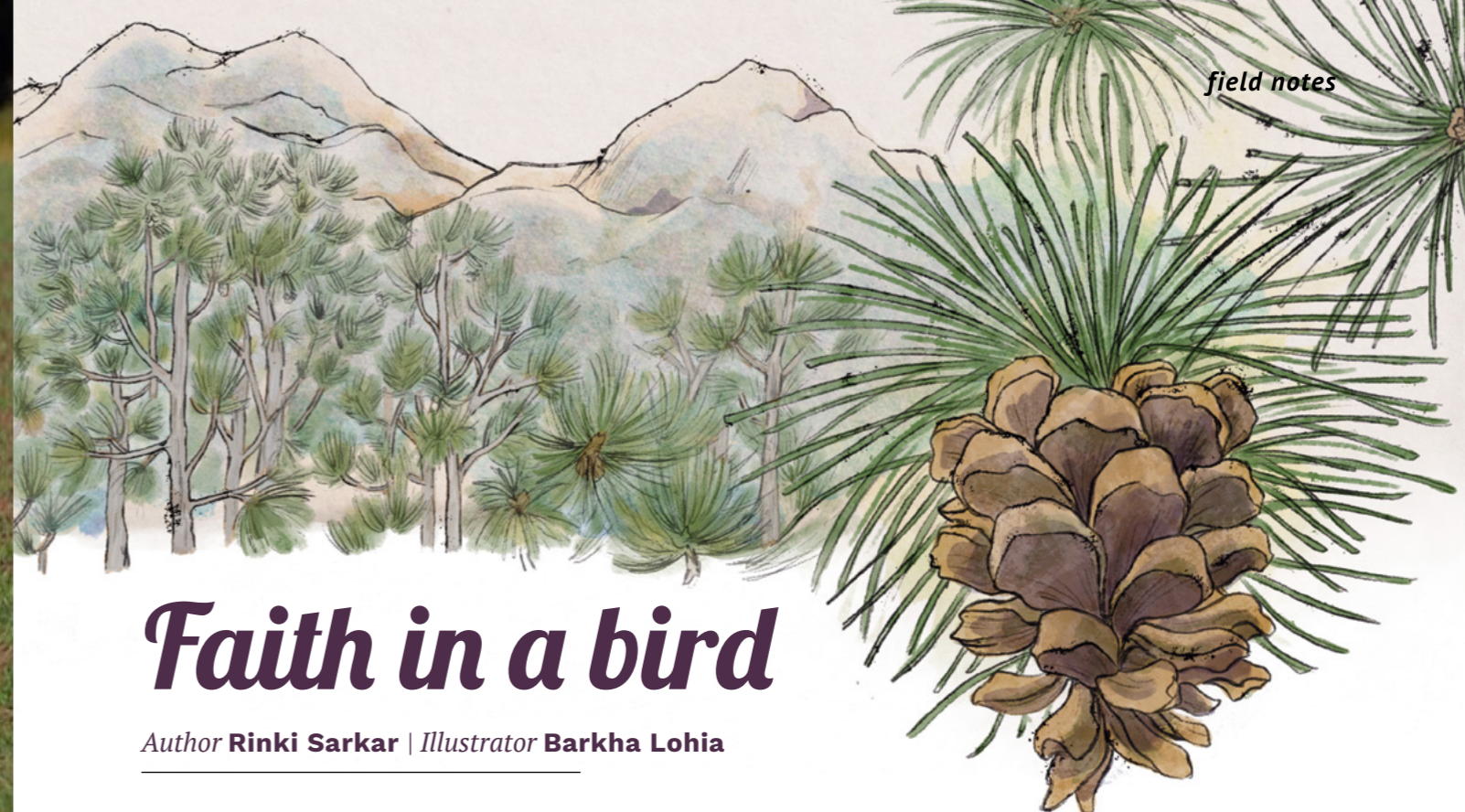


Mapping legal authority to build wildlife corridors along streams

Author **Amanda Stahl** | Photographers **Carson Jeffres & Jonathan Stahl**

Bears, elk, lynx, and other wildlife roam to find food, reproduce, or adapt to a changing environment. It is increasingly difficult for wildlife to move between protected areas, such as National parks, because the landscape is highly divided by differences in habitat condition, as well as the legal authority to change it. Conservation planners rely on maps of habitat and land ownership to identify the best locations for conserving corridors for wildlife movement. Researchers have recently devised a way to highlight practical opportunities to build wildlife corridors by mapping different types of legal authority.

Demonstrating the new approach in Okanogan County, Washington, northwestern USA, this study shows how local decisions affecting habitats along streams can provide options for wildlife to move between the Cascade Range and the Rocky Mountains. Along rivers and streams, numerous authorities and small conservation projects aim to improve river health, reduce flood or erosion hazards, and protect fish and wildlife habitat by planting trees, shrubs, or grasses. If individual projects (such as tree planting events) were viewed within the larger picture of rebuilding corridors, these efforts could be coordinated to achieve added benefits to wildlife.



Faith in a bird

Author **Rinki Sarkar** | Illustrator **Barkha Lohia**

Encountering a relatively inconspicuous temperate pine species in the higher reaches of the Indian Western Himalayas, was entirely an outcome of my exploratory trails across the captivating landscape and habitations of Kinnaur in Himachal Pradesh.

Spotting the endemic

While ambling along the streets of a village named Kalpa, I sighted a huddled group of locals, adorned in their customary green velvet caps. They were immersed in deep discussion over the season's irrigation water distribution logistics across households. This impressive community effort seemed to be governed by an indigenously constituted Gaon Vikas Committee (Village Development Committee) that has been in existence for a very long time. While enquiring if other forms of common property resources were being cooperatively managed in this manner, I stumbled upon a local edible pine nut known as Chilgoza. Chilgoza is collectively extracted from the wild by the native population, for self-consumption and for sale. I found that the pine nut is essentially a seed embedded in the cones of a specific pine tree that these mountain inhabitants referred to as Ree Bothang.

A spell of research engagements revealed that this temperate pine is scientifically known as *Pinus gerardiana* as a gesture of reverence for the indefatigable spirit of British explorer, Captain Alexander Gerard, who defied perilous topographical barriers to penetrate this secluded region way back in 1817. In his travelogue, Gerard vividly described the landscape to be rugged and mountainous to an extraordinary degree. He was the first to spot this obscure native pine and to introduce it to the formal domains of the botanical world.

I gathered that this was indeed a rare variety of pine. Its sparse and fragmented global distribution across steep xeric terrain of the western Hindu Kush Himalayas was perplexing, stirring me towards some in-depth probing. This initiative yielded striking results. Insights from recent phylogenetic studies attribute the nature of this scant and scattered distribution to unusual tectonic and climatic events during the Cenozoic era. These disrupting forces created constricted isolating environments influencing the evolutionary patterns and the distinctive sporadic occurrence of this temperate species.

This sequence of revelations was really intriguing. I lost no time and set off on reconnaissance surveys across the native habitat of the species. The intensity of cone collection was eye-catching, and I was propelled onto an important ecological concern. If the seeds were being over-extracted to be sold as edible pine nuts, would it not threaten natural regeneration and the sustainability of this range-restricted species? Would local governance mechanisms of resource use mediate any such unsustainable trends?

With locally customized maps showing habitat and legal authority along river networks, government agencies or conservation organizations can coordinate individual projects to achieve larger goals. For example, they can prioritize areas where small habitat improvements could contribute to an emerging wildlife corridor, or areas where the high-quality habitat needs only additional protection to ensure it will be maintained. Viewers can identify areas where small land acquisitions or conservation easements would fill gaps along a possible corridor without any new laws. Key areas of overlapping authority may also highlight opportunities to leverage river restoration dollars for wildlife. Future work will include mapping larger areas and exploring related data sources to deepen our understanding of both social and natural dimensions of conservation.

Further Reading

Stahl, A. T., A. K. Fremier and B. A. Cosens. 2020. Mapping legal authority for terrestrial conservation corridors along streams. *Conservation Biology* 34: 943-955.

Amanda Stahl studies riverine ecology and conservation policy. She recently completed a Ph.D. in Environmental and Natural Resource Sciences at Washington State University, USA.

Jonathan Stahl directs Adventure Programs and Experiential Learning at Washington State University, providing outdoor programs that foster leadership and environmental stewardship.

Dr. Carson Jeffres is a researcher at the Center for Watershed Sciences, University of California, Davis who studies how native fish utilize and benefit from restored habitats.

There I was in an arena that needed me to investigate and weigh the ecological versus livelihood outcomes of natural resource exploitation. Except in this case, conservation concerns appeared to be of prime importance as the temperate pine species under scrutiny was rare.

I felt it was imperative to alert the State Forest Department about my apprehensions and the exigencies of prioritising conservation of an endemic species. I did not hesitate to propose the urgency of a field-based research study in the Kinnaur Himalayas for comprehending the gravity of the situation. My genuine concerns did not go unheeded and a study was commissioned by the Department. The interdisciplinary field endeavour, conceived to assess the plight of these forests, focused on unearthing resource-use regimes, livelihood stakes and resource status under changing contextual parameters. The entire expanse of Chilgoza pine habitat between elevations of 2000 and 3000 meters was covered.

Trajectory of resource transitions

Oral history accounts gathered in the field, and archival evidence confirmed that until a few decades ago, the region was quite remote. Therefore, market potential of the pine nut yield remained virtually untapped. As pine nuts were extracted mainly for self-consumption and the population base of the region was insignificant, it may well be presumed that there were hardly any threats to these endemic pine forests in the past. The locals reiterated that it was not unusual to find ripe cones dangling from the branches even after the population's needs had been fully met.

The speedy development of National Highway-22, for strategic reasons after the 1962 Chinese aggression, dismantled all geographical barriers. A rapid transition towards horticulture followed causing booming local economies and rising incomes.

Better road connectivity and market integration also triggered the sale of pine nuts on an unprecedented scale. The resource started fetching a very high market price as it originates mainly from this restricted geographical domain. Field insights revealed shocking inter-temporal trends. Over the years, the lure of lucrative gains seems to have led to a vicious cycle of destructive and near-total harvesting of pine cones, declining yields, and spiralling prices. With the seeds sold off as pine nuts, one could envisage the insurmountable threats for natural regeneration.

Evidence emanating from the forest surveys corroborated these expected trends. Over-lopped branches due to reckless cone collection were a common sight. As anticipated, the sightings of seedlings and saplings were meagre across most of the forest transects, raising vital concerns about the long-term sustainability of these rare forests. To add to these woes, there has also been a sizeable loss of healthy Chilgoza forests to a series of hydropower projects and haphazard road alignments.

Neither the local community nor the State appeared to have confronted the negative ecological implications of resource extraction. The endemic nature of this species was not even common knowledge.

I discovered that the emerging scientific evidence on the vulnerability of the Himalayas to climate change predict primary extinction threats for range-restricted species such as Chilgoza pine. Under such impending circumstances these tree line forests would have nowhere to seek refuge.



Assuaging discovery


As natural regeneration had bothered me right from the inception of this study, I was hell-bent on photo-documenting every Chilgoza seedling and sapling encountered in the forest plots. These images exposed some unusual trends. Healthy regeneration was evident below rocks and I wondered how the seeds came to be dispersed in such odd locations. In some of these areas, clustered seedling growth was also visible. Meanwhile, stray local insights on the common crow's affinity to hoard pine seeds belowground kept baffling me intermittently.

Although my research journey so far seemed to be ending on a dismal note, an accidental discovery provided some room for solace. Thanks to my ordinary "point and shoot" camera, I seem to have inadvertently spotted an avian wonder which is capable of fostering natural regeneration for pines like Chilgoza. Such are the rewards of sauntering in the wilderness. It turns out that I was the first to have made this discovery along these Western Himalayan forest tracts! In what follows I elaborate on my path to the discovery.

While trailing behind my field team, I sensed a lot of bird activity in one of the Chilgoza pine forests we were passing. At first I thought the resonating sounds were those of a persevering woodpecker. When I finally spotted a bird precariously perched like a weather cock atop a mature cone dangling from the branch of a Chilgoza tree. I managed to capture it on my camera. It turned out to be the large-spotted nutcracker (*Nucifraga multipunctata*) of the corvid family, which is endemic to the Western Himalayas. Nutcrackers are a small genus of 2-3 species closely associated with montane coniferous forests across parts of North America, Europe and Asia. They are specialised feeders on pine seeds which forms a large fraction of their diet.

But what was the explanation for the cropping up of seedlings in the most unusual locations? Did it have anything to do with the common crow concealing seeds that my local respondents were trying to convey? I did not seem to have a definitive answer. But I had no idea that I was on the verge of unearthing one of the most fascinating biological interactions. While trying to make some sense of my inexplicable field observations, I chanced upon Hutchins and Lanner's research work as well as Diana Tomback's invigorating research findings on the role of avian seed dispersal for pines that have wingless seeds. The wingless feature of Chilgoza pine seeds was a vital clue for unravelling the mystery I could not solve. It appears that 20 out of a 100 odd species of pine belonging to the genus *Pinus*, have wingless seeds that cannot be scattered by wind. 19 of these, including the Chilgoza pine, fall under the subgenus *Strobus*, which are known to be dispersed by corvids, especially nutcrackers. There is established evidence on this nature of avian seed dispersal in the case of eight of these *Strobus* pines. It is presumed to be the same for the remaining species as well.





This bird-pine relationship is a classic instance of obligate mutualism, wherein neither species can survive without the other. This coexistence is crucial and mutually beneficial. While the pine is virtually dependent on its avian seed disperser for regeneration, the nutcracker is heavily dependent on the pine for its primary year-round food source.

Studies pertaining to the Western temperate belts have established that these nutcrackers have excellent spatial memory. They harvest tens of thousands of pine seeds and bury them in small caches for later retrieval during winter, spring and parts of the following summer. Their caches function as seed dispersal, as seeds that are not retrieved germinate in favourable years and congenial microsites. These fascinating insights were enough to deduce that the cropping up of single or multi-stem juvenile pines in the most unusual locations that I had repeatedly spotted could well be untapped nutcracker caches.

Morphological traits of both species have ingeniously evolved over time to facilitate this specialized interaction. The nutcracker has a sturdy pointed bill to break open cones easily and a well-developed pouch below the tongue to transport nearly 80-90 seeds at a time, to its caching sites. Bird-dispersed pines have special features which assist nutcracker foraging. For instance, seeds are wingless and heavy. Ripe seeds are retained in cones either by indehiscence or restraining flanges after cones dehisce. These traits prevent loss of seeds due to wind dispersal or passive seed dispersal. Nutcrackers cache in a variety of different topographical sites and away at long distances, sometimes causing seedling growth in clusters and a genetic population structure that is quite distinct from wind dispersed pines.

Scientific evidence has established that nutcrackers are primary seed dispersers for pines that have wingless seeds. Some other vertebrates may occasionally be effective as dispersers but rarely establishers. Only the nutcracker performs both roles.

This is because nutcrackers scatter-hoard well beyond their metabolic needs, at depths to reduce predation and desiccation and in sites favourable for growth making them potential dispersers capable of regenerating these *Strobus* pine forests.

Based on these scientific insights and my supportive field evidence, there is a high chance that bird-pine mutualism in Chilgoza pine forests does exist. A recent study undertaken to confirm the genetic diversity in Chilgoza forests found high rates of cross-pollination pointing towards substantial chances of pollen and seed migration from one site to another. The researchers did not provide any explanation for these trends. But this finding could well be attributed to the nutcrackers scatter hoarding of seeds across the landscape. This possibility is substantiated by recent research evidence from North America, where ringed nutcrackers were found to disperse seeds up to 32 kilometers, moving seeds longer distances than wind, rodents and every other seed-hoarding bird. These results consistently reinforce the feasibility of active nutcracker-pine interaction in Kinnaur. In this eventuality, the ruthless nature of seed extraction unravelled in this study could jeopardize the survival of the nutcracker and the pivotal role it may be playing in re-wilding the degrading landscape.

The poor status of Chilgoza pine forests calls for immediate attention to prevent the endemic species from aging away, besides mitigating threats to the fragile mountain ecosystem it may be judiciously harbouring. As artificial propagation strategies have not produced the expected results and a concerted conservation drive is still warranted, managing forests to enhance nutcracker visitation can be a cost-effective strategy for restoring the depleting forest stock. To achieve this end, locals could be incentivised to leave a few cones behind on every tree. It is also important to curtail cone collection altogether on a rotational basis from a few areas to facilitate recovery and regeneration. A similar approach could be initiated to restrict grazing so that seedlings and saplings are not susceptible to browsing or trampling.

Rinki Sarkar is a solitary researcher intoxicated by mountain landscapes. She also enjoys teaching and sharing her field insights only to experience the sparkle of spell-bound eyes.

Barkha Lohia loves working on picture books, editorials and sometimes dabble in tattoo art. Apart from these, she can often be found loitering around jungle spaces of Delhi.



Learning about human-wildlife interaction through taxidermy

Author & Photographer **Manisha Kumari**

Taxidermy is the art and science of preserving a dead animal using stuffing and mounting techniques. The Wildlife Protection Act (1972) defines taxidermy as the means of curing, preparing and preserving or mounting of trophies. Under the Act, hunting and taxidermy of scheduled species is banned. Possession of wildlife trophies and derivatives has to be declared by the owner, and tagged by the Forest Department to receive an ownership certificate.

Currently there is only one licensed wildlife taxidermist in India. Both wild and domesticated animals are curated by taxidermists. Taxidermy has been helpful in preserving extinct species in museums. In parts of western Arunachal Pradesh, indigenous communities practice taxidermy as a skill to display showpieces and trophies as status symbols. These communities are dependent on their forests for food and livelihoods. However, they are not aware of the legalities associated with it. For them, taxidermy is an art form requiring great skill and resolve, traits necessary to work with dead animals.

But in these communities, it is practiced only on specific iconic species. Mentioned below are two taxidermic works (red panda and leopard cat) done by the community under very different circumstances.



Stuffed red panda kept as a showpiece in the ex-hunter's house

The red panda used for stuffing was found dead; killed by wild dogs. It was brought to the village by the yak herder family who found it, and then an ex-hunter performed taxidermy on it. Red pandas are shy animals; spotting them in the wild is extremely difficult. The ex-hunter, wanting to preserve something rare and extraordinary, stuffed the dead animal to be kept as a showpiece in his house. Thanks to taxidermy, the community is now more aware of the presence of such a majestic species in their forests, and is working on protecting the animal's habitat.



Stuffed leopard cat kept outside the house as a trophy.

It was a very different situation for the leopard cat. The leopard cat killed a farmer's poultry, and in retaliation, the farmer killed the leopard cat. The leopard cat was then stuffed and hung outside in the balcony of the house, as a trophy and a reminder to the villagers what a menace the leopard cat was.

The study of taxidermy in the region has highlighted the issue of hunting, and the need for community-based conservation. The red panda found by the community was killed by wild dogs, and they are now aware of the dangers faced by wildlife in their forests. Similar taxidermic evidence from other parts of the state has helped in identifying threats to wildlife. In another incident, a Himalayan griffon was found preserved by the community, having died due to an electric shock from sitting on a utility pole.

On the other hand, hunting of wildlife has indicated unavailability of income opportunities and loss in livelihoods. The two major livelihoods in western Arunachal Pradesh are agriculture and livestock farming. Economic loss in these livelihoods from human-wildlife interaction has fuelled retaliatory killing in the region. The demand for bush meat, cash income from wildlife trade and human-wildlife conflict in agriculture and livestock farming are the main causes of wild animal hunting. Barking deer and serow are mostly hunted for their bush meat; Chinese pangolins, black bears are taken for the cash income in wildlife trade; wild pigs, porcupines and macaques for their role in crop depredation, and wild dogs and smaller cats responsible for livestock loss under retaliatory killing.



Meat of the barking deer being smoked as part of food preservation



Skin of the chinese pangolin being dried to be sold for cash income

These taxidermic examples show us the need for working with the community to conserve local wildlife, and the necessity of addressing human-wildlife interaction. Some communities in this region try to reduce human-wildlife interaction with the use of effective tools like mesh and electric fencing. Solar fencing is a worthwhile option to reduce economic losses in agriculture. Other measures like the construction of strong and robust sheds for livestock can help in reducing retaliatory killing of wildlife.



Mesh and solar fencing in farms close to forests in western Arunachal Pradesh

The community's relationship with wildlife is directed by the socio-cultural significance of the animals, and the economic dependency of the community on the forests. The practice of taxidermy portrays different facets of the human-wildlife relationship. Some fuelled by anger, others fuelled by dismay. Learning about this artform through the community's lens has helped unravel the different perspectives on wildlife and conservation issues in the region

Manisha Kumari is a light-hearted researcher working in Arunachal Pradesh. She enjoys photographing stories from indigenous communities but sulks at the idea of writing them.

#CCInktober2020

where art rushed in to meet science!

Author **Manini Bansal**

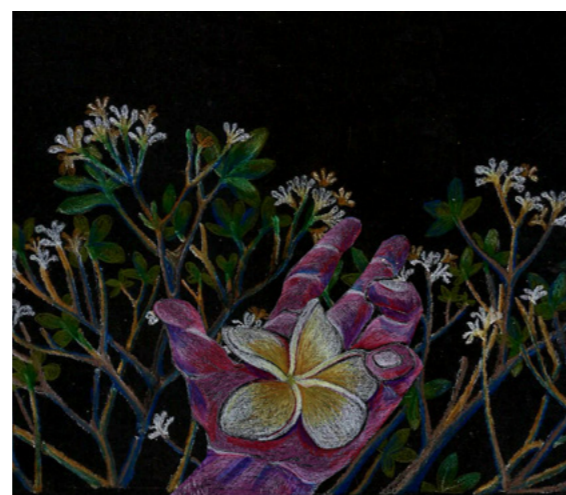
Jake Parker originally created Inktober in 2009 as a personal challenge, where he would draw something everyday for a month to improve his own drawing skills, while also learning to imbibe good drawing habits. This practice slowly gathered pace until it became the popular worldwide as the Inktober series on Instagram.

With the pandemic coming down hard on general morale, I felt the time was ripe for some wonderful mental engagement by hosting Current Conservation's version of Inktober for the first time. As a magazine that focuses on science communication, we believed there was no better time than now to creatively interact with our audience by giving them drawing prompts on topics like ecology, conservation, climate change, and species education.



Freedive spearfishing with the Sama-Bajau, a seaborne people from Southeast Asia, who practice subsistence fishing and live off the sea.

Rajasee Ray is a Kolkata-based illustrator and co-founder of Ladyfingers Co.



Every day and the collective memory around suburban flowering trees like the sweet-scented chaffa/ plumeria.

Vastavikta Bhagat is an architect, educator, and artist



Panda caregivers in China disguise themselves in panda costumes, in the hope that when young pandas are reintroduced into the wild they can learn to live free of human interaction.

Shrishti Chatterjee is a visual artist and researcher.



The Rainbow Agama is a social animal that spends its waking hours basking in the sun, often congregating in small groups on boulders or tree trunks.

Antara Raman is a freelance illustrator and graphic designer.

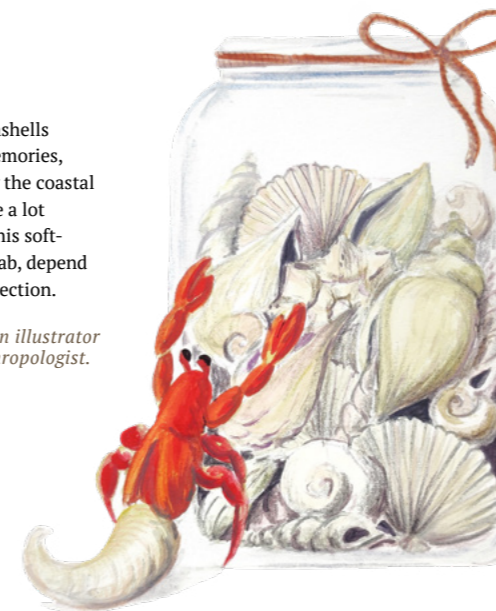


The ethereal gelatinous beauty is a pelagic sea slug known as Clione Limacina (sea Angel), inhabitants of the deep waters of Arctic and North Atlantic ocean.

Priyanka Gunjal is a doctor and medical Illustrator.

By picking up seashells for your jar of memories, you're disturbing the coastal ecosystem, where a lot of animals, like this soft-bodied Hermit crab, depend on shells for protection.

Sefi George is an illustrator and a social anthropologist.



Which made it incredibly fun for us to curate the prompt list. Some of the most popular ones were: 'invasive', 'waste', 'gentle giants', 'indigenous lives', 'human wildlife interaction', and 'home'. Participants were encouraged to look at the prompts through an environmental conservation lens.

Over the course of 31 days, Greta Ann Sam, the Assistant Managing Editor, and I carefully went through every submission to pick out 10 entries that spoke to us most. As a visually centered magazine, we were in perpetual awe of the construction, design intelligence, and thought put behind the entries that poured in.

We are very grateful to everyone who participated. Eagerly looking forward to hosting #CCInktober again. Until then, keep drawing!

Manini Bansal is a visual communication designer and photographer. She works as the managing editor and art director for Current Conservation.

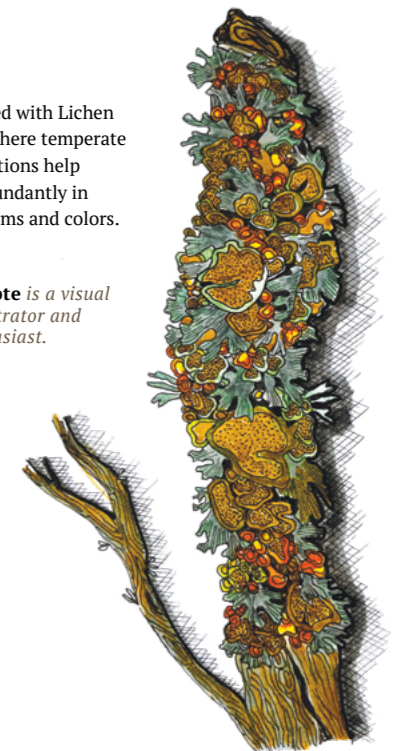
For most of us, coral feels like an alien species, residing far away at the bottom of the sea, out of sight, and unfortunately out of mind. Might we care for them more if they lived right next door?

Karunya Baskar is an illustrator & graphic designer



I was fascinated with Lichen in Denmark, where temperate climatic conditions help them grow abundantly in fascinating forms and colors.

Akanksha Apte is a visual designer, illustrator and a nature enthusiast.





How well does global marine protection cover drivers of biodiversity loss?

Author **Simone Stevenson** | Photographer **Michael Traurig**

Over the last 50 years, the area of ocean under protection has expanded by more than 30 percent, but biodiversity continues to decline. Human activities like fishing and shipping are key drivers of marine biodiversity loss. Protected areas are designed to work in a specific location to prevent or limit activities that damage biodiversity. However, establishing protected areas in places with a lot of human activity can be tricky because people rely on these areas for income, food and culture. Often, governments need to compromise nature protection to accommodate people's interests and livelihoods, which can lead to marine protected areas (MPAs) being established in places with minimal or no human intervention. We do not currently know how often and under what circumstances, government decisions to establish MPAs lead to these compromises. For example, are such compromises commonplace for high value areas like commercial tuna fishing grounds, or are they also considered for less lucrative uses like recreational fishing? If locations for protection are compromised too often in favour of economic or recreational gains, biodiversity in these areas will continue to be at risk.

We wanted to understand if some human activities are likelier to discourage marine protection than others. We were also interested in establishing whether allowing some human activity within an area of high economic value (rather than strict prohibition) improves its chances of MPA designation. To answer these questions, we compared the locations of over 3,000 MPAs worldwide with data on 15 types of human activity, and determined whether there was a relationship between the intensity of activity and protection status of an MPA.

It appears that MPA site selection is often influenced by social and political considerations rather than by environmental concerns. We found that MPAs are rarely established in the same locations as the most damaging drivers of biodiversity loss, including commercial fishing of mobile pelagic species. We also found that allowing limited human activity does not help improve the likelihood of designating an area as protected.

Unsurprisingly, we see that some human activities are a hindrance for biodiversity protection. If we are to reduce their impact on nature, we need to consider alternative management strategies, such as ecosystem-based fisheries management, in addition to improving MPA establishment in high-use locations. The fundamental aim of conservation must be to improve outcomes by selecting the best strategy for biodiversity protection.

Further Reading

Stevenson, S.L., Woolley, S.N.C., Barnett, J., Dunstan, P. 2020. Testing the presence of marine protected areas against their ability to reduce pressures on biodiversity. *Conservation Biology* 34: 622-631.

Simone Stevenson is a current PhD student at Deakin University whose research focuses on evidence-based decision making for global conservation problems.

Michael Traurig is a current PhD student at Deakin University whose research focuses on exploring the relationship between threats to ecosystem health and the benefits they provide to human well-being.

The lost and found department

Author **Shruti Sunderraman** | Illustrator **Triparna Maiti**

There is no Lost and Found department at the Kilpisjärvi Biological Station.

I went looking for a lost thermos. I heard someone yell, "I can't find my other sock!" We all found ourselves searching for belongings in a place that doesn't have a Lost and Found department.

Here's a guide to finding things around the Kilpisjärvi Biological Station:

Roll in the mud, the green, the soil. You have instructions to forget sight, sound and smell. Obey the wind. Your mind will let itself off its leash. You will not find the keys you lost. You will find the sense to be free.

Learn from the lichen. It will teach you endurance from cold winds and from reindeers of life stamping on your quests. You will not find your lost glove. But you may find vision.

Take off your jacket and dig your hands deep into the soil. Right up to your elbow. Maybe all the way up to your shoulder. And then your head. Bury yourself in bacteria and brown. The clay does not have your lost shoe. If you ask them gently, they might teach your nose lessons in paying attention to life in hidden places.

Gaze lightly across the lake. Screen the horizon for nothing in particular. The water is loud. You don't have to be. The skies approach. They don't come bearing a lost sweater. They have a message for you from Time.

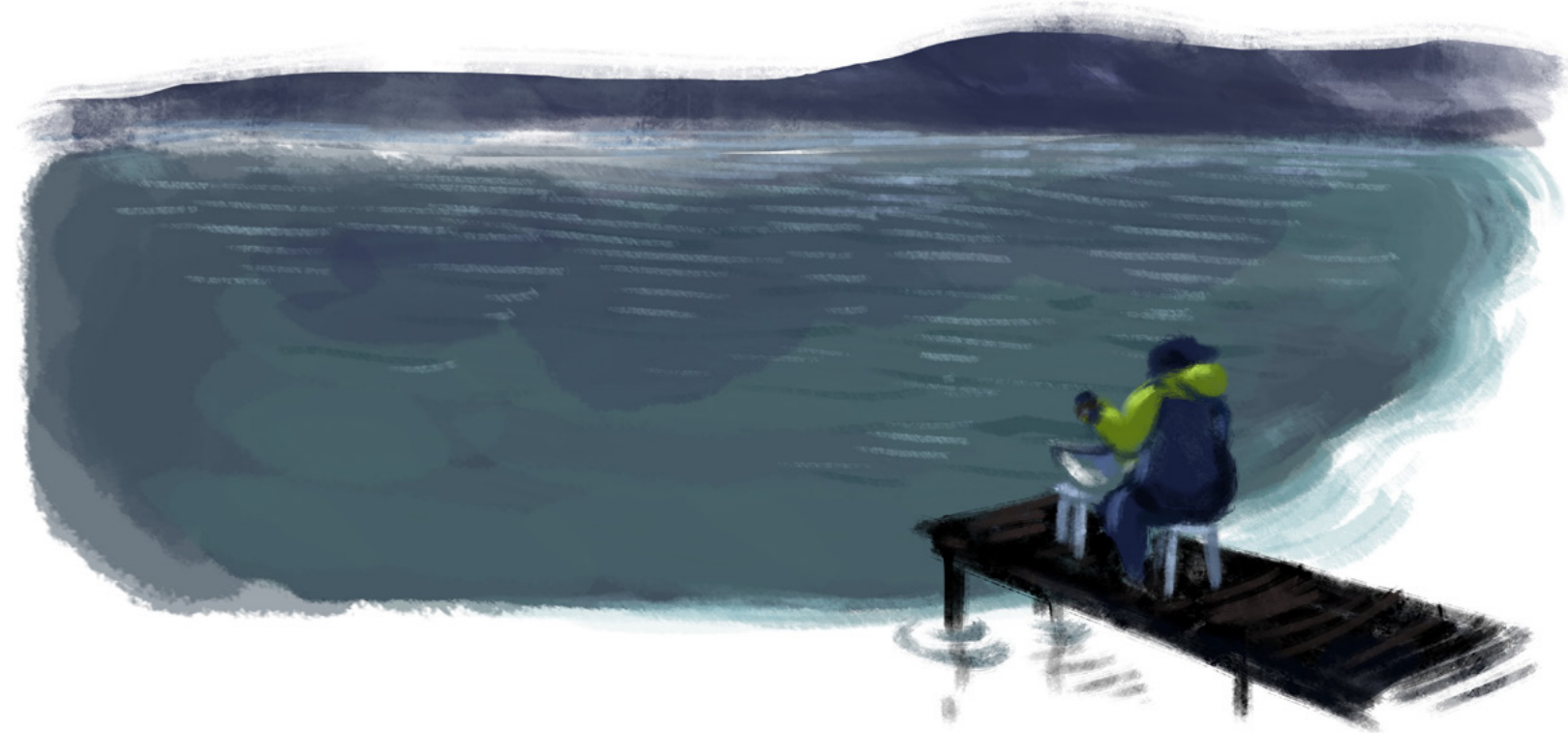
Climb the Saana with weak knees. Befriend reindeers. Respect their need for distance. Be gentle to their caution. The mountain and the reindeer have outlived human conclusions. They do not have your lost charger. They have sensibilities to offer. Drop your apparatus. Let them test you now.

If you have lost your compass at the Kilpisjärvi Biological Station, give up all will to find it. Some things ought to stay lost.

Note: Kilpisjärvi is a village located in Finnish Lapland. The author wrote this while on expedition with Helsinki-based Bioart Society.

Shruti Sunderraman is the Executive Editor of Current Conservation. She lives among her plants, with her cat.

Triparna Maiti is a visual artist who likes to draw and paint her little world of imagination. She is currently studying at Satyajit Ray Film and Television Institute Kolkata.



Don't look at me in that tone of voice

Author **Kartel Shockington**
Illustrator **Amit Kaikini**

'So, one Sunday afternoon, I go to the bull-fight and they put me in the bullring. The bull comes out. I look at the bull and the bull, he look at me. He look at me, and I look at the bull. And you know what, the bull was better looking than me.'

-Juan Cervantes, Mind Your Language, 1978.

We've been mulling over our recent posts with a seed of doubt in our minds. We cannot help but notice that our writings may have aggravated animal rights activists, castigated compassionate conservationists, and berated vegans and plant lovers. To our critics, we clearly voice irrational arguments and cross-eyed views of the world.

So we've tried a thought experiment. We have simply asked: 'What if they are right?'

Well, then, every animal must be given its due. Each one is a product of hundreds of millions of years of evolution on Earth. The history that each individual carries in its DNA, the carefully selected genes of the blind watchmaker, the memories of each moment of its personal journey must be celebrated, revered, venerated.

But what, practically, must follow from such sentiments? Perhaps the most important point is that it means that we must respect each animal not from our narrow anthropomorphic, anthropocentric perspective, but from the view of animal itself, of nature herself, of the watchmaker her/himself. And this in turn means that we must dig deeper into our engagements with the animal world, and rip out the very roots of these abusive relationships. This leads to a few inescapable conclusions, a trilogy of four to be precise.



First, no wildlife watching. Quite simply, wild animals don't like to be looked at. For most vertebrates, direct eye contact is a sign of aggression. Their motto is 'Don't be looking at me that way. In fact, don't look at me at all'. And even in the absence of actual eye contact, being closely observed by a human (or worse, a flock of them) is almost a clear signal of predatory intent. Thus begins the physiological domino. *It starts so simply, each line of the programme creating a new effect, just like poetry. First, a rush... heat... her heart flutters.*¹ And as the cocktail of chemicals floods the system, lion or lizard, fish or flamingo, she runs. All this stress from one little self-indulgent, greedy glance.

So, unless one is planning a romantic moonlight dinner, people should not look at wild animals at all. No more wildlife voyeurism, no bird-watching, not a single dive to scare sleeping parrotfish.

Second, no more domestic animals (with the exception of cats, who quietly decided that the comforts of domestication were suited to them). After all, they did not exactly ask to be domesticated. Of course, the only one who truly embraced the consequences of domestication was the cow at the restaurant at the end of the universe, which approached Zaphod Beeblebrox's table 'a large fat meaty quadruped of the bovine type with large watery eyes, small horns and what might almost have been an ingratiating smile on its lips.'

"Good evening," it lowed and sat back heavily on its haunches, "I am the main Dish of the Day. May I interest you in the parts of my body?"

Chickens get no evolutionary love from laying unfertilized eggs, nor can cows fatten their calves with dairy products. We should release them all into the wild, and allow them the unbridled joy of the wild's consequences.

And no domestic animals also means, by the way, no pets. No self-respecting animal wants to be reduced to an emotional appendage. Caged and cuddled alike, every animal aspires to be master of its own destiny. As brief and bloody as it might be. Set them free, we say. Let cats run wild and decimate bird and lizard populations around the world, even more than they do now. Let packs of dogs roam our streets and pick off the cats, and the occasional child. Let hamsters....

Finally, why stop at animals? We must also free plants. Gardens are basically glorified factories, exploiting sentient life forms for their colour, scent and form. Plants are pruned mercilessly without the remotest jot of participation, or prior-informed consent. No gardener has ever, not ever, used the word 'holiday' to her geraniums. Enough, we say, enough.

Fifth and mostly harmless, alien life forms. We wish to leave no stone unturned in our efforts to minimize human impact on life everywhere. Should there be an invasion by universe conquering computer geeks, every carbon-based multicellular life form must be received with the same respect and treated with dignity, regardless of their intentions. We do have to draw the line somewhere. Unicellular organisms and life forms based on other elements – Silicon's campaign notwithstanding – simply do not cut it.

Nuff said.

Kartel Shockington is a failed comic book creation with special powers of rapid hair loss. He sometimes appears as Kartik Shanker, and at other times as Dan Brockington.

of experience in digital advertising. He likes to explore Sci-Fi & Horror genres, with an interest in nature.

Kartik Shanker is at the Indian Institute of Science & Dakshin Foundation, Bangalore, India.

Daniel Brockington is at the University of Sheffield, UK.

Amit Kaikini is a freelance illustrator, with a decade



¹The Meringovian, in the The Matrix Reloaded (2003). The Wachowski brothers... sisters.... hmm... siblings.

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