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### volume 15.1





Cover art Shrobontika Dasgupta

As the Covid-19 crisis continues to unfold and impact our lives, we would like to offer you an escape between these pages. Our first stop is the lush forests of the Eastern Himalayas, where Ambika Aiyadurai and Mamata Pandya recount what happened once, a long, long time ago, when there was a tug of war between a mountain spirit and the Idu Mishmi people from Arunachal Pradesh, India. Heading west from there, Simon Pooley helps us rethink coexistence with wildlife-of the crocodilian kind—in the wetlands of Gujarat. Moving down south to the Western Ghats and in keeping with the reptilian theme, Udita Bansal reminds us that while roads serve to connect people, they are a major cause of snake mortality when they cut through forests. Further south, amidst the vanishing midland paddy fields of Kerala, Manju Vasudevan Sharma and Sreeja KG draw our attention to this seemingly unlikely sanctuary of floral and faunal biodiversity.

Then, in a couple of charming Field Notes, Daniel J. Read narrates an encounter with a common krait in his bathroom, and Bhavva lyer notes how an obsession with spotting tigers might mean missing out on everything else the forest has to offer. Manya Kotera's Research in Translation piece offers insights into the cultural and environmental perspectives of sacred groves and the crucial role played by local communities in their protection. Finally, this issue brings us two columns—one where the infamous Kartel Shockington receives letters from barnacles, anemone fish, deer, and several others, voicing their concerns over Nature and her ways; and a second column, in which Anusha Shankar, using the analogy of a tree, delves into the messy world of conservation careers and how they can be tended to and shaped.

We are delighted to present the first issue of Current Conservation of the year, which also happens to be my first as the Executive Editor. Undoubtedly, the most riveting part of the process for me was watching each article come to life through artespecially as someone who thinks in words. I can now attest to the magazine being a platform where art meets science.

### —Devathi Parashuram

We bid farewell to Ankila Hiremath, who is a Founding Editor, and has been involved with CC from the very beginning. In addition to her editorial skills, Ankila brought a calm presence, thoughtful comments and general warmth to the team which we will greatly miss. We are also bidding farewell to Matt Creasey, who worked closely with Ankila in launching and running CC Kids. Thanks Ankila and Matt for all that you have done for the magazine.

—Kartik Shanker

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### Author Daniel J. Read | Illustrator Bhavya K. Magdziarz

It's a hot, sticky monsoon afternoon of interviews in the buffer zone of Maharashtra's Melghat Tiger Reserve. I'm there making maps with people about places they avoid at certain times of day to reduce their chances of encountering dangerous wild animals. Having just completed the day's last interview, I return to my room, looking forward to a cool, refreshing bath. I throw my notebooks and papers on the bed and go straight to the bathroom, where I place my toiletries on top of the toilet tank, and turn on the shower faucet. I startle as a frog jumps up from the bathroom floor, having just been hit by the tap water. We stare at each other for a few seconds as I ponder whether one can sweep such a creature out of a room with a broom. Then, I hear a thump to my right. I look up and see the rearing head of a small, black snake with thin, white stripes emerging from my toiletry bag.

I quickly back out of the bathroom and call for Bishram, who manages the campus where I am staying. We had come across this snake before—if not the same individual, then one of the same species. To be clear, I am not sure if it is a venomous common krait (Bungarus caeruleus) or the krait's nonvenomous mimic, the wolf snake (Lycodon aulicus). But when Bishram and I had seen it before, we treated it as if it was a krait, and we thoroughly intend to do the same this time.

Along with the spectacled cobra, Russell's viper, and saw-scaled viper, the common krait is one of the 'Big Four' snakes in India—those responsible for the greatest number of 'medically significant' snake bites in India. 'Medically significant' is bureaucrat-ese for deadly. Krait venom contains a unique toxin that prevents brain signals associated with muscle movement to pass from one nerve cell to another, causing paralysis. People bitten by common kraits develop a variety of symptoms, which tend to progress from drooping eyelids, weakening eye muscles, abdominal pain, and facial weakness during the first 2-4 hours, to difficulty swallowing, lower limb weakness, and respiratory paralysis after 4-6 hours. Common kraits are nocturnal, and many bites occur when people accidentally roll onto the snake while sleeping on the floor. However, because bites are typically painless, most people do not wake up until they begin experiencing later symptoms. Antivenin can effectively clear venom from the system, but it cannot prevent or reverse neuromuscular paralysis, meaning that people who are bitten often require assisted ventilation in addition to antivenin.



I had researched all this information after Bishram and I first encountered what we thought was a common krait, and it all flashes through my head during this encounter. As I back away from the bathroom, the snake seems to disappear into my toiletry bag, which—like the snake—is black. I lose sight of it before Bishram reaches the bathroom. He arrives with a long bamboo stick, which he uses to carefully lift the bag onto the floor and poke through it. But the snake is not there. Despite further investigation of our surroundings, we cannot find it anywhere in the bathroom, toilet, or outside the window.

Some time goes by, and I discover that frogs can indeed be swept out of a room, but I cannot help but think that something does not add up. I had heard a thump, which suggests that the snake had fallen. But there was nowhere for it to have fallen from-no rafters or ledges in the bathroom at all. Considering it also seemed to have disappeared and no one else saw it, I begin to wonder if anxiety - a side-effect of my anti-malaria medication—had finally gotten the better of me, and that I had imagined the snake altogether. It was not until the following day that we realized what had happened.

After dinner, I hear Bishram calling me back to the bathroom. I quickly join him, and he points at the snake resting on the half-centimeter edge of tile that lines the walls, over seven feet up. Another campus employee, Tiwarilal, who is less afraid of snakes than either myself or Bishram, joins us and tries to lift the snake with the bamboo stick. As it attempts to evade Tiwarilal, the snake reveals its secret. It moves down into an up-until-then unknown gap between the tile and the concrete wall, where it must have escaped to the previous day. Eventually, Tiwarilal goads the snake back up by pouring water into the gap. He lifts it with the bamboo, puts it into a heavy plastic container, and takes it away on his motorcycle to release into the forest far from the campus.

The encounter with the snake changed how I moved and experienced the landscape during my fieldwork. Interviews and map-making could tell me where people think dangerous wildlife might be, and whether people avoid those places. However, these tools could not help me understand how wildlife encounters shape the way people experience the landscape. Having encountered snakes before, and being particularly eager to avoid them as a result of my medication-induced anxiety, I had always been cautious about where I stepped, especially when walking at night or off the main road. But until this encounter, I had never considered that I should also look up when trying to avoid snakes. From then on, I always looked both up in the trees and on the ground when walking in the forest, and always checked the rafters and the floor when entering a room. This is not to say that others perceive risks from wildlife in a similar way, but that from encounters with wildlife emerge new ways of seeing and experiencing landscapes.

Daniel J. Read is an environmental anthropologist who studies conservation in working landscapes.

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# Who am I to conservation: shaping how our career trees branch

Author Anusha Shankar | Illustrator Harjyot Khalsa

### The root and the trunk

Students of conservation and wildlife studies often start off with field experiences. I volunteered and interned on ecological projects, and fell in love with hiking in remote or human-dominated landscapes, looking for animals and watching them behave. Conservation career trees often seem to root us in this love of nature. We commune with open spaces and despite, or perhaps because of, all the challenges of living in sometimes harsh or isolating conditions, we want more. These early internships and volunteer experiences often form a solid trunk, launching these next few experiences. Many of us then go on to become conservation practitioners, playing a variety of support and leadership roles in conservation efforts, or going on to study conservation further in formalized ways. Either way, to succeed in this relatively non-traditional career path, we often need a strong support network of family/friends and teachers, nourishing and encouraging our advancement past these early stages of growth. I have managed to get to a postdoctoral position after years of studying ecology in various roles, nourished by my personal and academic communities.

### The branches

As we progress into further positions, we may branch out to learning statistics and data analysis and study design. Or to developing connections and trust with a diversity of local people at our field sites. Perhaps we pour our energy into learning how to self-manage our time and write grants, read papers, and/or write papers. And then our time often shifts to include managing other people, perhaps teaching others what we have learned. Somehow, we spend much more time studying wildlife by sitting at a computer, filling out paperwork, coordinating people and money, analysing data, or writing up our work. By the time we reach our mid-thirties, our priorities have often shifted—subtly, or perhaps multiple times, abruptly. Some people transplant themselves into conservation careers after building their career trunks elsewhere maybe engineering or journalism or law. By this point most of our career trees look quite different than we might've imagined a decade earlier. You might have shifted the species you study, from insects or birds or maybe even humans. Moving around and traveling as much isn't the primary focus anymore, and fieldwork is a rare luxury. Your tree has perhaps become more sedentary. You hopefully think of your tree like a longlived banyan tree—you can keep growing indefinitely and branching in whatever directions nourish you best. Do you want to learn more methods and scientific skills, or bolster your leadership skills? Perhaps consider taking management courses, which your younger sapling self might never have considered?

column

### The leaves

Though most of your everyday perspective might focus on the root and trunk and branches, what people really see on your tree are the leaves. What outputs do you have, in your papers and reports? How do you present your work to various audiences? And how do you interact with people during meetings and conferences and in emails? These outward components decide your tree's appearance, and help people identify your tree species. I think I'm a bit of a deciduous tree– I have to keep refreshing my leaves, questioning whether they're the right ones for me, to feel alive.

### Shaping your tree

There are a few things to consider about shaping your career tree, no matter which career stage you are at and regardless of the shape your tree has taken. Consider that some branches are and will be dead ends you might spend months working on an project or analysis or a professional relationship that doesn't work out. But this is par for the course in the life of the tree! These experiences often lead to other side branches, exposing you to new environments and ways of thinking. At the very least they are wonderful learning experiences; opportunities to learn what not to do. Another aspect of career growth is our attitude to our 'gardeners': other conservationists or scientists, who could shape and help optimise the trajectory of our career's growth, if we let them. It took me a long time to learn that even at a given time, I often need different inputs from multiple people to make progress.

### Tree alignment

I feel the most motivated when I have a vision of my destination in mind. It's helpful for me to envision what my future career tree could look like, perhaps in five years. What do I want to achieve, how many people or habitats do I want to have an impact on? What fields will my work touch, and what is missing for me to get there? Using the fundamentals of my knowledge and experience, how can I grow in currently relevant directions? If a funding theme becomes available, or a pressing conservation gap arises, can I adapt my research questions feasibly in that dimension, while still remaining aligned with my goals? One strategy I have developed to assess these alignment questions is to evaluate where I spend my time. As an ecologist, I often find my time fragmented across many types of tasks. This is inevitable in most careers. As in the sample week below, I try to periodically assess whether I am allocating my time in a meaningful way considering my envisioned tree. One tangible way to do this is to set quarterly or semi-annual goals, but in practice to only act on a daily or weekly to-do list, that is organised in such a way as to prioritise important, longer-term goals.





Figure 1: In my academic postdoctoral research position, I'm often curious about how I spent my time, and whether I can be more deliberate in how I allocate it. I have found that by tracking it, I can allot my time more consciously. Left: This is a sample week during which I worked for 31 hours, and this view is divided by broad categories rather than by tasks. I spent 10.7 hours (11%) on administrative work; 1.8 hours on mentoring (6%); and 26 hours on research-related activities (84%). Right: This was a week during which I worked for about 41 hours. Grouping some of these categories, I spent 5.5 hours (14%) on administrative work; 4.67 hours (12%) on mentoring; 7 hours (17%) attending seminars, webinars, and lab meetings; 21.26 hours (52%) on my research; and 2.16 hours (5%) on outreach work. I have found it useful to periodically assess whether the way I spend my time is aligned with my shorter- and longer-term goals. I find it most productive to be flexible but deliberate in how I allocate my time, and have found that this allocation changes drastically across career stages.

### Tree appearances

If you want to advocate for conservation, you need to be a reliable, appealing, trustworthy, and resourceful person yourself, first. Your career tree, even if it felt like it meandered through time, retrospectively forms one cohesive whole. Students the world over, but especially in cultures that reward humility, like India, are reticent to deliberately shape and cultivate how this tree appears to their employers; to "sell" or advertise themselves. We have been taught that singing one's own praise is bragging. And bragging is bad. So often, what we have done and what others think we have done are disconnected. We also somehow develop this idea, as students of nature, that we don't and shouldn't want money, really. So, marketing ourselves to increase our income also is anathema to many of us. But over the years I have learned that we are each our own greatest advocates. We need to advocate for ourselves and negotiate to satisfy and align our own needs and grow ourselves in useful dimensions.

For a moment, consider your career tree—yourself—as a brand. The world sees you by how you choose to present that brand. The posts you choose to put out on social media, the way you present your CV, the way you interact with people in every professional setting, these are all aspects of what should be one cohesive brand. If you send friend requests to professors or conservation professionals from all over the world, then your social media accounts are verging on professional. If you then post personal selfies and your thoughts on a political agenda, or share cat videos, remember that these are all part of how you choose to present your brand. If the messages the various platforms display are at odds with each other, it will look like your tree is a chimera—a confusing mix of species—rather than one cohesive whole.

# Guardians of the grove

Author Manya Kotera | Photos Wikimedia Commons

Sacred groves in India are fragments of forest dedicated to folk deities. Local communities protect such groves as they worship nature and derive spiritual value from them. The number of sacred groves have, however, been reducing due to urbanisation and socio-cultural changes. Motivated by the rising economic value of land, sacred groves have been cleared for commercial purposes. The spiritual significance of the groves has also been diluted because of loss of faith amongst the younger generation and the gradual assimilation of animistic tribal communities into mainstream Hinduism. As these groves have been protected for a long time, their disappearance is cause for great concern because of the loss of ecological and evolutionary information they have been preserving.

Ballullaya and colleagues conducted a study to understand the cultural and environmental perspectives of local communities with respect to the preservation of sacred groves. They focused on two regions of the Western Ghats in India-rural Kodagu in Karnataka and urban Kasaragod in Kerala, both of which contain many sacred groves. People living near these groves were interviewed to understand their views on the benefits and threats associated with the groves, as well as ways of maintaining them. The perceptions of local communities were found to significantly influence the management and conservation of sacred groves. In rural areas, the persistence of groves was attributed to strong cultural and religious beliefs, whereas in urban areas, it was due to an understanding of environmental benefits and use value. The conservation success of the groves was also dependent on the mode of governance, as community-managed groves had greater forest cover and lesser degradation than reserve forests managed by the Forest Department.



Anusha Shankar is a Rose Postdoctoral Fellow at the Cornell Lab of Ornithology.

Harjyot Khalsa is a communication designer with a penchant for children's books and hiking. She is currently volunteering at a sustainable art museum in Wiesenbach, Germany.



Recognizing the ability of communities to preserve sacred groves for their environmental significance, the researchers recommend complementing religious drivers with environmental understanding to ensure the survival of these groves. This would act as a safeguard for the groves in the context of evolving religious and cultural beliefs. To do so would require educating people on the environmental value of these sacred spaces, while also encouraging the preservation of traditional belief systems. In addition to this, they call for robust policies to ensure the protection of sacred groves by empowering local communities to manage them.

### Further Reading:

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> Manya Kotera is an undergraduate student at FLAME University, Pune. She studies Economics and Environmental Studies and is interested in areas where social science and ecology converge.

# Hit & Run! Reptile roadkills in the Western Ghats and mitigation measures

### Author Udita Bansal | Illustrator Ragini Chawla

Can you imagine living in a world without roads? A world where we would be walking through thick forests or deserts, or hiking up and down mountains to arrive at our destination. Probably without realising it, we consider roads to be a part of the positive spaces in which we live. However, have you ever stopped to wonder what we lose when we pave new roads?

While roads connect various types of human settlements, they also form "linear infrastructure intrusions" through natural habitats such as forests, oceans and grasslands. Roads cut through forests forming fragmented patches of what was originally a contiguous natural habitat. This is very disorienting for animals, as roads often become barriers to movement of animals across the landscape. Herds and flocks are often separated by these divisions. For animals with home ranges larger than the given patch, this causes immense stress. They are forced to find all their resources, including food, shelter, and mates, within the smaller area they are left with, thereby exhausting resources, causing inbreeding and the faster spread of diseases. This fate has befallen several animal species that are rare and endemic to certain areas, such as orangutans, which are only found in Borneo and Sumatra. As humans rapidly "develop the land" we run the risk of further boxing orangutans into smaller habitats, ensuring their extinction.

Roads cutting through forests or other terrestrial landscapes are a major cause of animal mortality worldwide. Vehicular collisions with crossing animals are extremely commonplace on highways surrounded by natural landscapes or on smooth roads, where traffic drives at extremely high speeds.

Most of you would have encountered an animal crossing in front of your car, and you may or not have been able to stop, depending on the speed and situation. While conducting research for my masters' thesis in Madagascar, a biodiverse island along the eastern coast of South Africa, I often found snakes and chameleons crossing the roads. Sometimes I found the snakes near urban areas on heavy traffic roads,

feature



while at other times they jumped or slithered away quickly on dirt roads in rural remote areas. So, I have personally encountered situations where I was able to successfully slow down or go around the animal and save them without disrupting traffic or landing in an accident. This was mostly thanks to the island having very less vehicular traffic in most areas and dirt roads in other areas. But I have also had the experience of applying the brakes very suddenly on a smooth single-lane highway to save a bird and its chicks crossing the road, naturally followed by my dad shouting at me, and lots of angry honking from the cars behind me (I am a wildlife ecologist, couldn't help it!).

In the time after my bachelor's degree, I was in Coorg, Karnataka, volunteering with the Western Ghats Nature Foundation — an NGO working on wildlife conservation. Considering my love for reptiles, when I heard from a friend about multiple dead snakes on an interstate highway connecting Karnataka and Kerala, I just had to go and see for myself to get numbers and species names. The highway had been recently renovated at the time of the study and was lined by forested areas on both sides. It cut through the Brahmagiri Wildlife Sanctuary in the Western Ghats, which is recognised as a global biodiversity hotspot. I would wake up early every day and ask one of my friends from the NGO to take me as a pillion on his bike to this highway stretch. We would let the bike crawl at the speed of a snail and I would scan the road for any dead animals. In a period of just eight days, I found a total of 117 road killed animals on a roughly 18 km stretch of the highway. You won't believe it, more than 60 (!!) of these were reptiles! This number was the highest amongst all the animal groups I found roadkill for, including amphibians, reptiles, insects and mammals. If lizards and snakes are to be counted separately within reptiles, snakes had higher incidences of mortality than lizards (I have a particular soft corner for snakes, so definitely not good news!). What made it worse was that I found so many beautiful snake species that I had not had the chance to see to date in the wild. Many of these species, such as the hump-nosed viper, the Malabar pit viper, and the Travancore wolf snake are also endemic to the Western Ghats. Being a herpetologist-a person who studies reptiles and amphibians-this was particularly heartbreaking.

Reptiles often cross roads to go from one patch to the other, but they can also be found simply sitting on the roads (Really, what joy is found in doing this?). They are cold-blooded animals who regulate their body temperature by behavioural means. They take shelter in shaded areas when their body heats up and come out in the sun when their body gets too cold. Certain areas, such as rocks or tar roads, are particularly beneficial for them to gain heat (basking in the sun). These surfaces heat up quicker in the day time as compared to the surrounding areas and lose heat slower than their surroundings at night. So, it is possible to find a snake coiled and chilling (actually trying to get warm) right in the middle of the road where the canopy of the forest does not obstruct the sun's light. I did find a dead snake in exactly that position! It was a beautiful coral snake with a shiny black and red body, a rare one to encounter when you go looking

in the forest. But I hope you might now understand why reptiles are particularly at risk of being run over by vehicles on the road. To add to this, there is the problem of their small size, which might render them invisible to vehicles moving at high speeds. And in India, snakes in particular are frowned upon. People often go out of their way to run one over if they see it crossing the road. It is sad, but true. That snake did no harm to anyone and was probably on its way to find a nice chick to hang out with. Alas!

Setting my sadness aside, I mapped out whatever data I had collected and located hotspots on that 18 km stretch of the highway, where more than one snake roadkill was found. I did this because I thought there may be some places with higher probability of snakes crossing the roads. And if we can do something at those locations to prevent roadkills, it would make some difference to these creatures at least. There are several solutions to such animal road mortalities. Some of the simplest ones include introducing speed limits and speed breakers, which allow the driver to slow down in time and may also allow animals to escape; reduction in traffic volume by regulating the number of vehicles allowed each day, especially during festivals and holidays; and temporary closure of roads, such as at night, when a majority of snake species are active, or during the breeding season of vulnerable species when their activity may be higher. Other mitigation measures for reptile roadkills include the construction of underpasses or culverts (underground pipes) along with fences. The fences can help prevent the animals from crossing the roads and direct their movement towards the underpasses or culverts, where they can cross safely. We could also place metal boards on the sides of roads which would heat up like the roads, and may be encountered and preferred by reptiles for basking, before they come onto the road.

Apart from reptiles, I found several other dead animals, including monkeys, during the survey. I suspect that the primary cause of higher mammal deaths is the irresponsible behaviour of people passing through the area, who were often observed stopping by to feed troops of monkeys. Such easy access to food would naturally bring the monkeys closer to the roads more often. Unfortunately, this may be particularly prevalent due to the mythological association of monkeys with the Hindu god Hanuman. A simple way to resolve this issue would be to ban the stopping of cars along this forested stretch of the highway, which would require more regular patrolling by the forest department or the local police, both of which have offices nearby.

Most animal roadkill mitigation measures do not require too much effort or monetary funds, and can be introduced before, during, or after road construction. It is our responsibility to at least provide animals safe passage within their natural habitats. Further studies could better inform our decisions pertaining to suitable mitigation measures. Hence, many conservation organisations have come up with phone applications–for example, 'Roadkills' and 'Road Watch'–which let you record roadkills.



### feature



So the next time you're on the road, I hope you have one of these apps on your phone, avoid overspeeding, keep an eye out for wild animals while crossing green areas, and record any roadkills you encounter so that scientists and wildlife conservationists can use the data to save some animals, if not all, from extinction.

P.S. This might also help you see some animals that you may never see during the wildlife safaris you pay heavily for. I once saw an aardwolf (go Google!) while driving on the road in South Africa and trust me, it is one of my most cherished sightings ever!

### Further reading

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**Udita Bansal** studies ecology and evolution of reptiles at Indian Institute of Science, Bengaluru. She is fascinated by the evolutionary ecology of colour variation in reptiles.

**Ragini Chawla** is an artist based in Glasgow. She recently graduated with an MFA degree from the Glasgow School of Art. With painting at the core of her interests, she is interested in illustrations for children..

Illustration of the process of transformation of natural landscapes due to deforestation and clearing for development of linear infrastructure such as roads



### Tales from Dibang Valley: Why are the Ākrū's Horns Curved?

### Author Ambika Aiyadurai & Mamata Pandya | Illustrator Shrobontika Dasgupta

It was Jeeha Tacho's favourite time of the day. All was quiet in the tiny village of Etabe, where he lived. The family had finished the work for the day, and he sat with his grandmother by the fire. "Naya, what story will you tell me tonight?"

Jeeha loved Naya's stories. Naya's stories were the stories of his people, the Idu Mishmi, passed down from generations. Jeeha's favourite stories were about the animals that lived in the forests and the mountains that surrounded his tiny village.

Naya's face glowed in the reflection of the fire. "Let me think. Today, I will tell you about the ākrū." she said.

"What is the ākrū, Naya?"

"The ākrū lives in the high mountains. It is a strange-looking animal, like a mix of a goat and an antelope. It has a heavy, hairy body, and hunched shoulders with a thick short neck. But it has short legs and a short tail. What makes it look even odder is its nose, which looks like a swollen black bulb."

Little Jeeha closed his eyes and painted a visual picture of the ākrū as Naya described it. "Does it have horns, Naya? Like the màcō (sambar) and the māāy (serow)?"

"No", said Naya, "The ākrū's horns are not like theirs." She pointed to the short curved horns on the animal skull board. "The ākrū's horns were not always curved like this. They say that a long time ago, they were long and straight."

Jeeha's eyes widened. "How did they become curved then, Naya?"

Naya's focus deepened. "Many years ago, Idu Mishmis were very confused about the ākrū. 'What kind of animal is this ākrū', they wondered? One of the Idu Mishmi men said, 'Look at its slanted back, no other animal has a back like this'.

Another man said, 'Look at its face. It looks like a goat, but is it a goat?' Another one said, 'But see, its horns are not like that of a goat'. A young one said, 'This animal looks like it has been put together from different parts of different animals!' Everyone laughed.

The old hunter said, 'Do not make fun of the ākrū. Ngōlō, the mountain spirit, will get angry. All the ākrū belong to him, no?'

'No! They belong to us, the Idu Mishmi people', the others said."

"Then what happened, Naya?" asked Jeeha, slowly lying down and placing his head on his grandmother's lap.

"Then? Both Ngōlō and the Idu people claimed that the ākrū belonged to them. For a long time, this continued. Then it was decided that there would be a competition between Ngōlō and the Idu people to decide. There would be a tug of war!

The Idu people invited everyone from Dibang Valley to take part in this competition. On that morning, Ngōlō and the Idu people met at an open ground, where the ākrū stood at the centre of the field.

All the Idu people took their place at the rear end of the animal, and their strongest hunter grasped the tail of the animal in a firm grip. The rest of the clan clamoured behind him, one after another, holding the one in front tightly by the waist. The mountain spirit Ngōlō, bravely stood alone in front of the animal and held its straight and long horns, one in each hand.



Both sides started pulling the animal towards themselves. The ākrū was also strong and stocky. It held its ground firmly as it was pulled in two directions. It was a tough competition between Ngōlō and the Idu.

Ngōlō kept a steady grip on the horns, even though the ākrū was tossing its head back and the Mishmis were pulling with all their might from behind. As it was being pulled forward, the ākrū's heavy horns slowly started curving backwards and upwards.

The Idu people struggled with all their combined might to hang on to the tail. But they were no match for the powerful Ngōlō. By the time the ākrū's horns had curved, the tail began slipping out of their hands, and suddenly, with a snap, most of it came away in their hands, leaving only a stub attached on the back of the ākrū!

Ngōlō won, and from then on Ngōlō claimed that the ākrū belonged to him.

And so, the tale goes—this is how the ākrū's horns became curved, and why it has a body that slants downwards, and why it has a short tail."

"Naya, have you ever seen the ākrū?" asked Jeeha.

"Very few people have seen the ākrū. Hunters who have trekked up to where the ground is covered with snow, often talk about the ākrū.

Some say they move in large numbers, even groups as large as 300! Who knows if this is true? I have never seen one," said Naya.

Jeeha was now very curious to see this ākrū. He decided that one day, when he was older, he would trek up the Dibang mountains with his father, and who knows, maybe he would see an ākrū! And he fell asleep on Naya's lap, dreaming of the ākrū, and the snow-covered mountains.

This is one of the many tales told by the Idu Mishmi. With the lack of a written script, most of these stories are orally passed down through generations. Idu Mishmi lore is rich with tales about mammals, birds, grasshoppers, and frogs, which also tells us a lot about their natural landscape.





The takin is one of the animals that appears in the mythological stories of the Idu Mishmi. Locally called the ākrū', it is a wild goat-antelope found in parts of Arunachal Pradesh, Myanmar, China and Bhutan. One of the four subspecies is the Mishmi takin (Budorcas taxicolor taxicolor). In Arunachal Pradesh, the presence of takin has been recorded on the higher peaks and ridges of Tawang, Siang valley, Lower Dibang valley, Anjaw, and southern Lohit districts. According to the IUCN, it is categorized as 'vulnerable', indicating that their population is decreasing. The Indian Wildlife Protection Act (1972) classifies the takin as a Schedule I species, a status similar to that of the tiger.

The Idu Mishmi are one of the three subgroups of the Mishmi-one of the 26 major tribal groups of Arunachal Pradesh. The Idu Mishmi live in the Dibang Valley and Lower Dibang Valley districts of Arunachal Pradesh, with a small population in the Upper Siang district. The Dibang Valley district is the least populated district in India, with a population of about 14000 Idu Mishmi. The region is known for its rich wildlife, beautiful snow-clad mountains, and high altitude wetlands. The Idu Mishmi are primarily dependent on swidden cultivation and forest produce: Life in the high mountains adjoining the Sino-India border is tough, because of the rugged terrain and harsh weather conditions. Animals are an integral part of their culture and life.

This is one of the stories narrated by Ananta Meme, a friend, an Idu Mishmi, and a resident of the Dibang Valley district. We have retold the story so that it can be shared with a wider audience.

### Dedication

I (AA), met Jeeha Tacho in 2012 when I started my PhD fieldwork in Anini, the district headquarters of Dibang Valley of Arunachal Pradesh. I stayed with his family, in Jeeha's home for a year. He was 10 years old. We became good friends and spent time birdwatching, plucking fruits, and cooking. In 2017, Jeeha's life was cut short in a tragic accident close to Etabe village. This story is dedicated to him.

**Ambika Aiyadurai** has been doing field research in Arunachal Pradesh for over a decade. She teaches Anthropology in Indian Institute of Technology -Gandhinagar.

and 2D animation.

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feature

Shrobontika Dasgupta is a storyteller who likes to express herself through art – particularly via Illustration



### Missing the forest for the tiger

Author Bhavya Iyer | Illustrator Sayan Mukherjee

I spent over two months working in Panna Tiger Reserve, and yet, the first and only time I saw a tiger there was on my first day. The setting sun cast a golden hue on the grass fields of Pipartola, and set the Ken river on fire, as a radio-collared tigress leisurely strolled across the rocky riverbed. The distance was great enough that I needed binoculars to get a good look at her, but the moment was perfect. And yet, while that was the only time I ever saw a tiger in the Reserve known for its successful reintroduction of the species, Panna never let me feel like I was missing out.

From leopards to *mahua* trees, *chousingha* (four-horned antelope) to vultures, my time in Panna was full of new sights, sounds, and even smells, that kept me constantly at the edge of my seat, wondering what there was to see around every turn of the winding, rocky roads, what new sight to take in or new behaviour to observe.

Many tourists feel a safari is incomplete until they have caught a glimpse of the big cat. I don't blame them—my own family was disappointed to have missed out on a tiger sighting, despite multiple early morning safaris in the biting cold of December. Tigers are magnificent creatures, and few animals measure up to the glory of a wild tiger in its prime. Yet, in this fervor to get a Sighting (with a capital S) people often miss out on everything else the forest has to offer.

At Dhundhua, a small stream runs from a shallow, rocky bed to fall a few hundred feet in a rainbow-making spray that lends the place its name. Vultures—mostly long-billed—will gather gregariously right at the very edge of the cliff where the water falls, occasionally bathing, squabbling, or sunbathing. When you cross this stream and arrive at the viewing point, you see a gorge, nestled in which is a dense jungle. Tales are told of roaring tigers wandering the bottom of the gorge, cubs in tow, providing excellent photo opportunities to lucky tourists.

Arriving at Dhundhua involves a rapid-fire of wildlife sightings, one after the other in dizzying succession—an Oriental hobby sits on a tree by the cliff, orange chest puffed out in the cold. A redheaded vulture looms on a skeleton-like snag in the distance. A painted francolin bursts out of the brush and careens across the road like a headless chicken. A *chinkara* (Indian gazelle) skips before a line of parked Gypsys.

To one side the stream falls, and stretching from the stream to beyond in a vast circle are the cliffs, on which the long-billed vultures roost. *Ficus* trees sprout, defying gravity, emerald against the sheer cliff walls. The canyon seems empty until you take a closer look, and see the scores of vultures lining the crevasses, huddled together or singly, all along the canyon. It's a breathtaking sight, and gives one hope for the future of plummeting vulture populations.

We drive down the red dust roads beyond Dhundhua, over narrow paths winding through the patchy dry deciduous trees, mostly leafless in the December cold, the trees dwindling until grasslands stretch into the distance, dense scrub just beyond. The path widens and we reach a charming but empty forest rest house, meant for visiting dignitaries, but which offers an ideal lunch spot for others. There, we can disembark to eat our packed breakfast of fruits, and my parents and brother receive the gift the wild so often gives me—silence. The wind blows through the grasses, the birds chirp intermittently, and not a single Gypsy vehicle can be heard, no tourists venturing so far into this zone, where tiger sightings are few. In that clear, cold air, I imagine that my family too feels some of the city dust being gently blown off their souls, and some of that peace I feel whenever I am lucky enough to tread these wild places.





As the sun climbs higher, we make our way back down the valley to Pipartola-by-the-Ken. The scattered *ber* trees have a browsing line so sharp, from the nilgai and *chital* (spotted deer) feeding on their boughs, that it looks like a very conscientious gardener was let loose in the park. The sandy road bears tiger pugmarks and tyre prints, but the branches of a nearby tree are so full of yellowfooted green pigeons that you can't tell the tree is bare and leafless, and so we forgive the tiger for avoiding us.

A chital, its antlers still wrapped in soft velvet, chews on the old, shed-off antlers from a season past, replenishing its lost calcium. Another, feeding on leaves, stares at us blankly, dried velvet peeling off its antlers in bloody tatters, and I am reminded that nature isn't averse to blood and bone like humans are.

If you take a boat ride down the Ken river, the fun continues. The water is jewel-green, and one of the many explanations people give for the National Park's name (Panna means 'emerald') is for the colour of the river. A mugger crocodile basks on a rock, almost blending in. A pair of lesser adjutant storks settle on a tree, too far for my camera to capture in the shaking boat, but with binoculars we can make out their balding, combed-over heads.

When I leave Panna, my heart is lightened. My stay has rejuvenated me, but it is time to say farewell. The tigers may not have, but Panna blessed me with an abundance of life, sharing — as she does-her riches freely. I hope you, too, visit and are blessed with these riches. I hope you don't miss the forest and its many denizens for the tiger.

### Further Reading:

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### Author Simon Pooley | Illustrator Athulya Pillai

Sitting outside on a bed frame between my guides and friends, Anirudh Vasava and Niyati Patel, I have a view of the large pond in Traj, a village in the Kheda district of Gujarat, India. We are here to talk to Hemant Ode, the father of a girl who was killed by a mugger crocodile (Crocodilus palustris) at the washing place, a short distance from us. A cow is tethered near us, and four water buffaloes graze nearby. Hemant sits with us, while his wife, Naniben, watches us from the veranda of their house, a few steps away. The smell of wet cow dung, which she has been using to coat the floor, hangs in the air.

Their daughter, Hetal Ode, was washing a large steel pot in the pond. A few other children were swimming nearby. When the pot fell into the water, she had to wade out until she was waist-deep to fetch it. This was when the crocodile seized her by the wrist and pulled her under. Adults were called, and they searched for her without success. After 30 minutes, the mugger surfaced with the girl. The villagers chased it into the shallow water and recovered her body. Hetal was nine years old, the only child of Hemant and Naniben Ode.

The study of such tragic incidents, and the responses of locals and the authorities to them, is a growing topic in conservation science. A new journal, Frontiers in Conservation Science, features a whole section focused on such negative human-wildlife interactions. As a result of climate change, human expansion into wildlife habitats, and successful conservation efforts, encounters with wildlife are increasing. Most studies of such encounters focus on things that go wrong. Conservationists use their knowledge of wild animals to try preventing bad things from happening, and to persuade and help locals to live safely alongside damagecausing wildlife.

While this is important and useful work, it has resulted in a focus on the negative interactions between humans and wildlife-"human-wildlife conflict"-as well as on human-human conflicts over how to deal with these problems. Much of this work focuses on the harm wild animals cause, and on trying to compensate for this through monetary payments or offering economic benefits for tolerating damage caused by wildlife. This means we have not paid enough attention to where things do work well and people coexist with wildlife. In turn, we also overlook the many non-economic dimensions of people's relationship with wildlife and the natural world.

feature

**Bhavya lyer** has itchy feet that take her in search of wild landscapes and dark coffee. An alumnus of the Wildlife Institute of India, she has an interest in carnivore ecology and environmental policy.

Sayan Mukherjee is an illustrator, muralist, character designer, lifestyle and story illustrator. After spending several years working within the advertising world, Sayan went into his solo career pursuing his passion for illustration and storytelling.



Simply put, it refers to a sustainable although dynamic state (there will be ups and downs, as negative interactions will sometimes occur), where humans and wildlife adapt to sharing landscapes. Tolerance can be passive. For example, not killing a predator which kills your domestic animal. Tolerance can also be active, by taking steps to avoid conflict, such as building islands for muggers to bask on safely and reduce encounters on the shore, as done in the village pond at Deva, Anand district, Gujarat. Importantly, human interactions with wildlife must be effectively governed to ensure wildlife populations persist. We believe such governance will only work if it is socially accepted, locals are represented and involved, and management ensures tolerable risk levels.

I came to the Charotar region of Gujarat to witness the coexistence of locals with crocodiles described by regional crocodile experts — Dr Raju Vyas and Anirudh Vasava of the Vidyanagar Nature Club (VNC). VNC has been running a successful annual Charotar Crocodile Count since 2013, involving local residents, schoolchildren, and wildlife enthusiasts from all over India, in observing crocodiles and learning about their ecological role in the region's wetlands. In a survey of mugger attacks conducted during VNC crocodile counts (2013–15), Vasava and his team learnt about four attacks on humans between 2009–2014. These incidents occurred in the villages of Traj, Deva and Heranj, and there have been a handful of attacks since then. The VNC survey also recorded attacks on livestock in the villages of Laval, Malataj, Traj, Changa, Heranj, Dabhou, and Dali. Despite these attacks, these communities are widely tolerant of muggers, and there are many recorded 'rescues' (16 between August 2013–November 2014), wherein crocodiles were removed from areas where they pose a risk to humans or livestock, and were either released back into the village pond, or transported for release in the Pariyej wetland.



Vishal Mistry, an expert local natural historian and VNC member, brought us to meet Hemant Ode. I had not come to Traj to hear about conflicts and hatred for crocodiles, but to learn about this man's extraordinary response to the tragic loss of his daughter, Hetal, to a crocodile. First, it is important to stress that both parents were still clearly devastated by their loss. A head-and-shoulders photograph of Hetal hangs on the front wall outside of their home. A pretty, smiling girl in a blue dress looks out from a wooden frame with a gold rim. A simple glass bead necklace hugs the frame (presumably Hetal's).

Hemant is 42, a lean man with a lantern jaw. He grew up in the village and remembers no attacks from his childhood. He wasn't even warned by his father or grandfather to be careful around the crocodiles in the pond. The village committee leases the pond to fishermen, who come every year to net fish. They catch and tether larger muggers on the bank, to keep them out of the way until they are done fishing. The children sometimes come and tease these muggers, and should be more careful not to get nipped, Hemant says.

Remarkably, following the loss of his daughter, Hemant has not campaigned to have the mugger killed or removed from the pond. He is nevertheless afraid to go near the water now, and says you should be cautious of crocodiles. "If you tease them, harm will come to you," he says. Removing muggers known to locals will result in new and unknown muggers moving in, he reasons. Hemant does not have negative feelings towards crocodiles. In fact, he has become a mugger *mitra*, joining a 'crocodile's friend' scheme and advising people on staying safe around crocodiles. He has even participated in two mugger rescues–capturing and removing crocodiles from places where they might pose a threat to humans.

### Myth, message, meaning

Hemant tells us that a good strategy for raising local awareness is through the Hindu goddess Khodiyar, who is always shown riding on the back of or standing next to a mugger. The story of Khodiyar originated in Gujarat around 1,300 years ago. Of magical birth, she got her name through an injury to her foot, while on a journey to fetch a remedy for her brother, who was bitten by a snake. Limping, she was helped by a mugger crocodile, who carried her on its back, and for this service she came to be worshipped as Khodiyar *maa*. She is still widely worshipped in the region, answering prayers, healing and protecting her adherents (not specifically from crocodiles).

Hemant and Naniben were eventually paid a small amount of compensation for the loss of their daughter, but this had minimal impact on their attitudes towards crocodiles. Studying the situation at Traj as a conflict would miss quite a lot of what is happening here. More recently, an old man named Lakshman Chavda was killed by a crocodile in the same village pond. He had been advised against getting into the water, but continued to take long baths in the pond. Later, in the office of the village *sarpanch* (mayor) Ajay C Patel, Lakshman's son, Manish, told us that nobody is to blame because it is well-known that

crocodiles are present and the responsibility to be careful lies with people. Manish told us he wasn't angry with the crocodile when the attack occurred, but only anxious to recover his father's body (Lakshman's body was recovered the morning after the attack, bitten but not consumed). The *sarpanch*, a stocky, active man with close-cropped hair, says that crocodiles have lived in the pond for a very long time, and are a part of local life. Fishing is allowed in the pond, but enough fish are left for the crocodiles. The mugger that attacked Lakshman Chavda was caught (there was some debate over whether the right one was caught!), and removed to a nearby wetland, Pariyej. Warning signs have been erected and the village council has applied to the Forest Department for a Crocodile Exclusion Enclosure.

In our recent paper published in the journal Conservation Biology, Anirudh Vasava, Saloni Bhatia, and I argue that it is in shared landscapes such as these Indian farmlands, that human-wildlife interactions should be studied, rather than in and around conservation's more traditional focus—protected areas. Coexistence does not mean there isn't any conflict. We spoke with villagers in the neighbouring Vadodara district, who didn't want crocodiles living nearby. Some hinted at wanting to kill them, but feared prosecution. Coexistence occurs where there are ways of dealing with the occasional harmful event in ways acceptable to locals, and where there is tolerance for the animals responsible for them, as demonstrated by the remarkable villagers of Traj. Of course, this doesn't just involve studying how humans interact with wildlife, but also studying how animals like large crocodiles have adapted to living (for the most part), peaceably alongside humans.

Studying coexistence with wildlife requires different skills to those usually used by conservation scientists. It is important to think through what it means to interact with local people, often with different customs, spiritual beliefs, social norms, and economic status. Researchers have an ethical duty to ensure no harm comes to those they work with. Asking people about traumatic events requires empathy and tact, and putting the feelings of interviewees first. This kind of research takes a long time, and is best done in collaboration with local experts and field workers. It is important to approach communities in the proper way, get necessary permissions and earn people's trust, while also taking into account the concerns of local institutions and the government too.





Management recommendations for human-wildlife conflict scenarios mostly focus on prevention and one-off or short-term compensation measures, but we should remember that people's lives may be changed forever, and attitudes deeply affected in the long term, by traumatic encounters with wildlife. Researchers should also remember that after they have gone, or their papers have been published, it is the locals and the local authorities who continue living with wildlife. In areas of the world where significant wildlife persists outside of protected areas, these populations still exist largely because of varying degrees of long-term human-wildlife coexistence.

Studying coexistence where it occurs in the world, respectfully and using the appropriate methods, will greatly enhance our understanding of the ways in which humans and wildlife can coexist. It can reveal how different values systems and cultures promote tolerance of wildlife. It can also highlight other dimensions to consider, besides rational decision-making based on calculations of costs and benefits. In these challenging times for biodiversity, it will also (while acknowledging harms and conflicts) bring us stories of hope, and grounds for optimism that we can coexist with wild animals.

On my way back to Ahmedabad at the end of my visit, I received a text from Vishal Mistry with a photo of Hemant Ode next to the trap they had used to catch the crocodile that had attacked Lakshman in the pond at Traj. It had been on its way home, from where it was released in the Pariyej wetland. We have much to learn about managing human-crocodile interactions, but this story gives me hope that we can do so in ways that allow both to flourish together.

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**Simon Pooley** *is the Lambert Lecturer in Environment (Applied Herpetology) at Birkbeck University of London. He studies human-wildlife conflicts and coexistence, in particular with crocodilians.* 

Athulya Pillai is an illustrator and storyteller, documenting people, places and creatures. Co-creator of Stories from Ladakh.



# Forgotten sanctuaries of biodiversityvanishing midland paddy fields of Kerala

### Author Sreeja KG & Manju Vasudevan Sharma | Illustrator Anala Tanmaya Rao

The winter moon, a waxing gibbous, has risen early. On an ancient mango tree on the edge of the paddyland sits a crested hawk-eagle. The last of the bee-eaters dive for one more meal above the ripening paddy. A red-wattled lapwing is pestering a straggly group of unconcerned cattle egrets in a fallow field. In a shadowy stretch of the stream that flows through the paddy field, a small blue kingfisher sketches a sapphire streak. It's the time of the year when wild berries ripen on thorny bushes, scandents and climbers on the stream bank. The pale pink ones of *panal (Glycosmis pentaphylla)*, the small shiny black *thodali (Ziziphus oenoplia)*, the blush red-tinged green *kotta (Microcos paniculata )* and many more shades, sizes, and flavours. Behind the grasses that have turned golden, the velvety new flush of *adakkamaniyan (Sphaeranthus indicus)* peeps out. Soon their purple globose flower heads will be out, dotting the bunds of the harvested fields.

The midland paddy fields located in the river basins of short but perennial west-flowing rivers of the Western Ghats in Kerala are a threatened ecosystem. These paddy fields form the lowest feature of a micro-watershed (usually 4–30 m above mean sea level) and are of great hydrological and ecological significance. Numerous first-order streams are born here that then join the main rivers in their middle and lower courses. The fields act as a natural reservoir of water that enrich the local groundwater table and provide 'rooms for rivers' when they flood during the monsoons. These modified wetlands created over centuries of ploughing, levelling, and unique land and water management practices, are also among the last safe harbours for floral and faunal biodiversity, in what is not a forested terrain and yet, wild.

Paddy fields fringing gently sloping garden lands were a typical feature of the Kerala midland landscape until the late 1980s. We belong to a generation that witnessed the large-scale conversion and reclamation of this singular landscape into garden lands with perennial tree crops and prime real estate. In a state that is perpetually land-hungry, the paddy fields were also the quick answer



to all developmental projects that require contiguous land such as airports, colleges, hospitals, and bus stations. The host of challenges that paddy farming faced during this time-from high labour cost to low produce price-accelerated the pace of the conversion. By the time the Kerala Conservation of Paddy Land and Wetland Act, 2008, came into effect, nearly 80% (6000 sq. km) of paddy fields in the state had already been converted. Four decades of widespread conversions have left us with merely 1900 sq. km of paddylands, which include the larger Kole and Kuttanad lowland paddy systems<sup>1</sup>. The fragmented midland paddy fields constitute about half of this.

### Hidden pockets of biodiversity

The typical midland paddyland is 10-100 hectares (0.01-1 sq. km), often partitioned by a stream flowing through the middle. Smaller watercourses and manmade canals criss-cross the field for irrigation and drainage needs. The stream networks link together various small ponds within the field and tanks in the bordering garden lands. There are subtle variations in the biodiversity found in and around the paddy fields. Medium-statured trees, shrubs and creepers have established in the pond and field margins, while bamboos and tall grasses abound on the stream banks and bunds. There is a dominance of ephemeral herbs and shrubs that complete their life cycle within a season or two. Grasses and sedges grow on the stream and in-field bunds and in the fields themselves, and get razed by manmade fires during harsh summers. The plants that are found here have successfully adapted to short periods of monsoon flooding. Most herbaceous species seed profusely. The shrubs are hardy, deep-rooted, and are also copious seeders.

<sup>1</sup>The Kole-Kuttanad wetland system is located 2-3 meters below sea level, contiguous with the Vembanad estuary on its North and South. Paddy is cultivated only during summers by pumping out water from the polders, which are protected by earthen embankments. It is the second largest Ramsar site in India after the Sunderbans. Paddy fields provide sanctuary to essentially two types of floral biodiversity-niche plants exclusive to paddy fields, and those trees, shrubs, herbs, grasses and sedges that have been banished from garden lands and homesteads. The midland paddy fields are now arks of biodiversity that were previously abundant in poramboke lands<sup>2</sup>, multi-tiered homestead lands, public spaces, and along roads and water courses. With the increase in population and builtup land, regular cleaning drives by the MGNREGS<sup>3</sup> workforce and annexation by more aggressive invasive plants, public and private spaces are now hostile towards unruly, nameless and untamed plants that are 'weeds'. Weed clumps are now suspect spaces that hide poisonous reptiles, where household wastes get dumped surreptitiously and which mar the 'neat and safe' ideal of a living space that is the new aspiration. Live fences where shrub and creeper diversities flourished have also given way to brick and mortar walls. The fragmentation and gentrification of the Kerala homestead landscape, and rapid loss of other public spaces has left a limited homogenous collection of trees and ornamental plants that are deemed 'useful', 'beautiful' and 'innocuous'. The paddy fields that survived the conversion and reclamation phase are the only spaces that have remained relatively untouched by this massive taming drive.

Considered 'useless', this seemingly unimpressive floral diversity of paddy fields hosts a large faunal population ranging from arthropods and molluscs, to wetland birds, reptiles and amphibians, and mammals like mongooses, civets, and jackals.

<sup>3</sup>MGNREGS or Mahatma Gandhi National Rural Employment Guarantee Scheme aims at enhancing rural livelihood security by guaranteeing hundred days of wageemployment in a financial year to a rural household whose adult members volunteer to do unskilled manual work.

<sup>&</sup>lt;sup>2</sup> Poramboke' refers to unassessed lands outside of revenue records vested with the government. The term is usually associated with 'waste lands', even though these were often rich abodes of biodiversity.



### **Glimpses of human linkages**

As socio-cultural commons contained within and surrounding private ownership, the paddy fields had once played an incomparable role in Kerala's midland life and livelihood sphere. A variety of delectable greens, fish, and molluscs assured nutritional security, especially during the raging monsoons. The herb and shrub diversity contained diverse medicinal plants, which were used for making ayurvedic and home remedies to treat a host of health conditions. Many of the seasonal herbs were treasured for their cosmetic properties and applications in hair, skin, and eye care. The knowledge of plant properties and habitats were passed on orally as evocative plant names, or as oft-repeated adage and lore. Take for instance, the wide variety of edible wild spinach found in this habitat. Common names are suffixed with cheera (spinach), by which they are marked as edible. Often the prefix describes either its habitat (Tottucheera/Parambucheera), its nature (Mullancheera/Maracheera/ Paalcheera)/Kozhuppacheera), resemblance (Nellicheera) or the preparation it is best suited for (Achharcheera/Sambaarcheera). The wild berries and fruits were the staple of rampaging children, who spent summer vacations in these fields, which were transformed into playgrounds for the season. These plants, their nomenclature, uses, and the paddy land pockets that they grow in are being slowly forgotten, with little use and none to treasure them.

Even when privately owned, the midland paddy fields defy strict boundaries of use and ownership. The stream banks, bunds, and live fences are treated as common property, even if they have ownership rights ascribed to them. What's more, the seasonal nature of cultivation, the indirect benefits of sharing, such as manuring of the field by grazing cattle, the sheer vastness of the area, and the socio-cultural history of use, have fostered a fragile overlapping of property regimes. The absentee-ownership of land during the decline of paddy farming also allowed for an alternate informal steward class to develop, mostly from the socially and economically marginalised communities and castes. These user communities had a seasonal dependence on paddylands, which supported numerous subsidiary livelihoods.

The plentiful and diverse grasses of the fields were an assured source of fresh feed for cows and goats. They were brought to graze on stream bunds and in the fallow fields, during the summer. The abundant fish catch during the monsoons was another income bolster. Transhumance of ducks in the harvested fields fostered migrant livelihoods. Several medicinal plants were harvested in bulk from the paddy fields for supply in the local market. The Pandanus protecting the stream banks from erosion were used in mat weaving. Even flowers of Pandanus, called Ketaki in Sanskrit, were used to perfume wardrobes. The streams themselves were used for retting of coconut fronds that were then used as roofing material. The livelihood dependence seems to have stood the test of time. These paddy fields are the only common grazing lands left for the local livestock, the transhumance of ducks has prevailed, and fishing is still practised. However, mat weaving is rare today, while Pandanus itself is disappearing from the fields—a sad instance of vanishing co-existence.

### Changes in sociocultural fabric

With decline in commons across the state, the paddy fields now offer rare outdoor spaces for stepping out in the evenings with company, a place to hang out for the elderly and the youth, secluded spots for alcohol consumption, and outdoor locations for wedding photoshoots.

Since the Act of 2008 and the restrictions therein, there is a grudging slowdown in the conversion of midland paddylands. Aided by several government programmes for encouraging rice cultivation in the paddy fallows, widely adopted mechanisation of operations, assured minimum support price for paddy, and guaranteed government procurement, what is left of the midland paddy fields is slowly being cultivated once more. However, threats still loom or are around the corner—potential land acquisitions for petroleum storage facilities, new highways, and airports. The entertainment industry is also beginning to use these paddylands as novel aesthetic spaces.

Yet, hope lies in our collective effort to live consciously and recognize our role in this diverse world, and the many interdependencies and feedback mechanisms that sustain our ecosystems. On a weekend winter morning, black-headed ibises, purple moorhens and western reef egrets forage in the open waters, starlings create patterns in the sky, bee-eaters and drongos feast on insects (pests, we think) above strips of ripening paddy crop. Sitting on the bund is a pair of boys awaiting a fresh catch with their modern angling gadget. An egg-sac of a praying mantis clasps a blade of grass on the trail. What else are these but reminders that we are part of an intricate web of food and life?

**Dr Sreeja K G**, Director Research at EQUINOCT Community Sourced Modelling Solutions, is working with communities towards enhancing climate change resilience and responsibility. She is also the INTACH Climate Change and Heritage Fellow 2020.

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### Author Kartel Shockington | Illustrator Amit Kaikini

Help!

(Help!) I need somebody (Help!) Not just anybody (Help!) You know I need someone (Help!)

The Beatles

In our last outing, we realized that Nature was brutish and dangerous. We proposed many kind, humane, and gentle ways to prevent her from wreaking havoc on her hapless creatures. Word has gotten out that Kartel Shockington is sympathetic to all life forms. Some have said that he is pathetic, but we are ignoring those inanimates for now.

Letters have started to pour in. From bugs to beatles, fish to frogs, snails to snakes, peacocks to pandas, and turtles to tigers, they have written in to voice their concern over Nature and her ways. For the benefit of our readers, we reproduce some of them below<sup>1</sup>.

OHDEER

### Dear Generally Shockington,

What kind of life is this? Constant anxiety. Bob Sapolsky may write about stuff like chronic and episodic stress, but we think it's no fun being chased all the time. We've tried everything. We've played the numbers game, we've set up an alarm system. Nothing really works. Every third fawn is eaten. If it isn't the pompous tiger (we were so happy to hear their numbers were declining) it's the lurking leopard, or the brazen wild dog. Isn't there a place where lions and tigers eat fish<sup>2</sup>?

Yours enduringly John Deer

1. With due credit to Dr. Tatiana's Sex Guide for all Creation. Thanks and Sorry, Olivia Judson. 2. As a matter of fact, Phantom has set up just such a place, called the Garden of Eden. but we haven't been able to locate it yet.

### Dear Messrs. Shockington,

I am writing to seek your legal advice regarding a separation. I have been locked in this mutualism with an alga, yes, a blooming alga, for millions of years. After such a long time together, I am afraid the relationship has grown stale, moldy. Bad thoughts mushroom, especially on those rainy gloomy days. Perhaps the time has come for this lichen to end.

Yours unfaithfully, Fungus R Us

Dear It's a Shockington, We are a respectable waterbird couple

We have been trying our best to instil a sense of responsibility in our chicks, but the bigger one keeps killing the smaller one in every clutch. It's not simple to evolve an optimal clutch size - we know what we are doing, But try telling your children that. It's bad enough having a name of the sort we do. Now how do we keep up with the Joneses and leave more geneses? Going loco parentis, Blue-footed booby

### Dear (don't look at me in that) Shockingtone of voice,

ROAR I heard that some deer have written to you complaining about my meat-eating habits. They have variously described it as disgusting, primitive and atavistic. Well, I have something to say to them. They have it easy. Their prey doesn't run and hide, appoint sentinels that squeal in alarm at the sight of you, use sneaky colouration, or deploy a host of other anti-predator tactics that have fancy names like the confusion effect and the oddity effect. My dear deer: Sit still, will you A tiger's gotta eat too.

(my stomach's) Growling Tiger

### Dear I'm still in Shockington,

I write to you from a pod. And peas in a pod may well be alike, but we beans are clearly not. Here I am minding my own business, and the seed next to me is hogging all the resources. I am pretty sure that is not what my mum wants. I will soon be a has been.

Yours fruitlessly, To been or not to been

### Dear Shockingtongue,

You're not going to believe my story. I am an anemone fish; we have earned some notoriety thanks to Cousin Nemo. I live in harmony with my anemone, as we have done for generations. Now along comes this louse (literally and figuratively), who sneaks her way into my mouth through my gills, severs the blood vessels to my tongue, and attaches herself to the stub. She has become my tongue.

Not in jest, Anemone in Agony



column PANTHERA TIGRIS







### Dear Lord ... Shockington,

We hear that you have received complaints from the herbivores, but those are first world problems. We are the true subalterns. We have no way to defend ourselves, whether we are being grazed to oblivion by bison or wildebeest. We hear our cousins in the ocean are being wiped out by marauding greeen turtles. Where are the tigers and tiger sharks when you need them? We ask you to help us- where would you be without our 'knolls' and 'leaves of'? Yours silently.

 $\mathbf{O}$ 

The grass (is not greener)

### Dear Lady Shockbeth,

We are assasins. We kill by releasing compounds, nasty ones, into the soil or through our leaves. With sinister names like Juglone, Terpene and Alkaloid, we inhibit the growth of other plants and mess with megaherbivores. All the perfumes of Arabia will not sweeten our little tendrils. We are shocked at this fuss over a little killing. We are sure you understand.

**BWAHAHAHA!!** Yours chemically, Allelopaths Anonymous

### Dear Major Shockington,

REENER (NOT)

It's hard enough being a barnacle. Lockdown - shmockdown. We are under rockdown our entire lives. Stuck to a single rock, waves batter at us relentlessly, and yet we hold on resolutely. And then comes along this larger barnacle, billions of blue blistering ones, smothering and crowding us out. Pushing us to the limits of the tide, at the mercy of the sun. Darwin may have found us fascinating, but that doesn't help us, does it? Please find us a haven.

Yours on edge, Charles Barnacle

We were truly shockingtoned at all that goes on in the animal kingdom, not to mention with plants and even fungi. Nature is weird and cruel. Though we have to say that we couldn't help the occasional chuckle, for she does have a wicked sense of humus. These letters only strengthen our conviction- she cannot be trusted to look after her own.

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.

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

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