

Notes on the Natural History, Ecology and Conservation of the Agasthyamalai region, Western Ghats, India

AGASTHYA

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IN THIS ISSUE

Editorial	3
Story of the missing bark	5
Revisiting the abandoned tea estates	6
Chop chop gang	8
Role of the avian community in seed dispersal and ecosystem restoration	10
Life in the canopy	11
Unclaimed homes	12
The other side	15
Two fields, two philosophies	16
Fences, hedgerows, and what we began to notice	18
Exploring the hidden world of bats in Tirunelveli	19
Narambu: the man who turned a sandbank into a riparian forest	21
Namma ooru nandavanam: reviving sacred gardens	22
Rethinking restoration in a changing river	25
Listening to the smallest voices	27
Restoration is a relationship	28
Restoration as a trophic windfall	30
Wetlands are blooming, but at what cost?	32
Wings in the weeds	33
Grasslands on the brink	34
Spiny reminder of why grasslands matter	36
The role of <i>Dodonaea viscosa</i> in grassland ecosystems	37
Life of the dryland: notes from a restoration site	38
Restoring ecosystems by restoring relationships: notes from Mundal's shore	41
The wild schoolyard	42
Ecosystem restoration in Southern Tamil Nadu	44
Behind the scenes: ASPIRE project	46
News and events	55
Snippets from the field	55
Interns	56

Cover Page: The tea estate in Kalakad-Mundanthurai Tiger Reserve (KMTR)

Back Cover: Front view of Agasthyamalai Community Conservation Centre

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Editorial

Ground In Between

Walking the Singampatti village roadside, I often find the soft pink lotus flowering and filling the water tanks. A few kilometres away, in Mayiladumparai, I see newly occupied apartments emerging in the open space, with resettled plantation-estate workers from the Kalakad–Mundanthurai Tiger Reserve chatting outside at night. Scenes like these are unfolding across the Agasthyamalai landscape and beyond, offering visible reminders of a landscape in transition and the difficult questions that emerge with it.

The Agasthyamalai Community Conservation Centre (ACCC) has worked across this landscape for decades and has witnessed these social-ecological changes firsthand. Today, the field station is brimming with initiatives centred on restoration, drawing on knowledge accrued over the years. This growing focus comes at a time when biodiversity loss and landscape degradation have brought restoration to the forefront of environmental action, particularly with the declaration of the UN Decade on Ecosystem Restoration (2021–2030). Yet, efforts on the ground have often remained isolated, focused on particular ecosystems and following a single-ecosystem approach. This issue brings together stories from the landscape undergoing restoration and the relationships that connect ecological processes, livelihoods, and everyday life. It takes inspiration from Ainthinai, the five (ain) landscapes (“thinai”) of classical Tamil poetry, which offers a way of understanding landscapes as intertwined ecological, social, and cultural worlds. The contributions explore how different forms of knowledge can help us understand restoration in its local contexts. Drawing on observational, experimental, and theoretical perspectives, often through storytelling, they approach the landscape through multiple ways of seeing and knowing. Together, they offer a glimpse of the participatory potential of ecological restoration and the ongoing dialogue between humans and nature.

While we often frame restoration in ecological terms, its practice also raises important ethical questions: Restoration for whom, and guided by whose values? The contributions bring ecological and social concerns into conversation, exploring how restoration reshapes livelihoods, access, and relationships with nature, and what it means to the individuals and communities who experience it. The pursuit of biodiversity restoration must therefore also ask whether our efforts are socially just and attentive to place-based knowledge.

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Story of the missing bark

In 1998, there was an interesting paper on the diet of leopards in Kalakad–Mundanthurai Tiger Reserve. It was the first of its kind for the reserve. Leopards, apart from feeding on a variety of other animals, also fed on muntjac, or the barking deer. These deer were probably restricted to a few places and were generally rare in KMTR. No one I spoke to mentioned it as abundant or said they had seen it in the 1990s, but this paper showed that barking deer were not only eaten, but that a substantial number of animals were probably consumed by leopards.

Around 2021-22, another paper came out that looked at the diet of the wild dog, the leopard, and the tiger, a classic large mammal study. This showed that the leopard largely preyed on langurs and mouse deer, and barking deer constituted less than 1% of its prey. Quite intriguing. Our field assistant, Boothathan, with his vast experience roaming the forests of KMTR, said he had not seen it, but he knew of people who had sighted it in some remote locations. But wait a minute, recently I spoke to an estate worker from Manjolai, and she said she had seen this animal in the estate and even mentioned that it barks like a dog! So maybe these animals were very few in number and occurred only in some places within KMTR.

One place where the barking deer was noticeably absent was in the forests of Nalumukku and Upper Kodayar, even though we have recorded almost every other mammal known from KMTR there, including the black leopard. About a year ago, we started monitoring

mammals in the abandoned tea estates of BBTC. We regularly see species such as the dhole, the leopard, the bear, and elephants, apart from the sambar, gaur, and wild boar. Then came a photograph from near Oothu that reportedly showed a barking deer. At first, I only heard about the image and had not seen it myself. But when I finally examined the photograph, there was no doubt; it was a barking deer. This finally confirmed the presence of the barking deer in the tea estates above Manjolai.

In all these 30+ years of roaming the estates and the forests of Upper Kodayar, Kakachi, and Manjolai, neither I nor many others had ever heard or seen any evidence of barking deer in this area. So how did it come here? We don't know. Did it move to higher elevations from Manjolai at 800 m? The abandoned upper tea estates have become very attractive to species from the lower elevations, including the sloth bear and the Rufous Babbler, which, though generally found around the grass savannas of Manjolai, are now seen at Oothu. As the abandoned tea estates regenerate, with an assemblage of trees, shrubs, and an increasing diversity of animals, there is always a sense of suspense, something new to discover every time you visit. It all goes to show how quickly animals adapt when their habitat is allowed to recover.

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Revisiting the abandoned tea estates

Kalakad–Mundanthurai Tiger Reserve (KMTR) contains more than 5,400 ha of private land that falls under plantation areas, religious settlements, and Electricity Board settlements. Of this, the Bombay Burmah Trading Corporation (BBTC) estate occupies about 3,391 ha, with 2,230 ha used for growing tea, coffee, cardamom, and eucalyptus plantations. The estate was leased for 99 years beginning in 1929, with the lease period set to end in 2028, but its operations were discontinued early, in August 2024. Since then, over the past two years, ATREE-ACCC and the Tamil Nadu Forest Department have initiated forest restoration activities in the abandoned BBTC estates, building on earlier work in 2008, when the organisation studied the regeneration of forest species in abandoned tea plantations at Chinnamanjulai and Netterikkal in KMTR that had been abandoned for more than 17 years. Findings from that effort showed that abandoned tea plantations at lower elevations were heavily invaded by *Lantana camara*, while at higher elevations the tea plants had turned into trees, alongside a few *Lantana camara*, *Psidium guajava* (guava), and *Citrus sinensis* (orange).

To understand how native forest trees have colonised these abandoned estates since that 2008 study, the ACCC team made a three-day trek to monitor ecological changes. On the first day (11 June 2025), it was a comfortable ride to the Sengaltheri Forest Guest House, where we spent the night. The next morning, we started our trek with Forest Department staff from the Karumandi Amman River, at an elevation of 1,066 m, to Netterikkal Dam, at 1,350 m. Along the way, we lost the trail in some places, since the route was completely overgrown with reed bamboo (*Ochlandra* sp.), trampled by elephants, and diverted further by fallen trees. The trail itself involved a steep climb,

crossed several streams, and gave us rain and leeches for company. One important location along the route was Yaanai Elumbu Odai (Elephant Bone Stream), which served both as a resting point and as the boundary between two forest ranges.

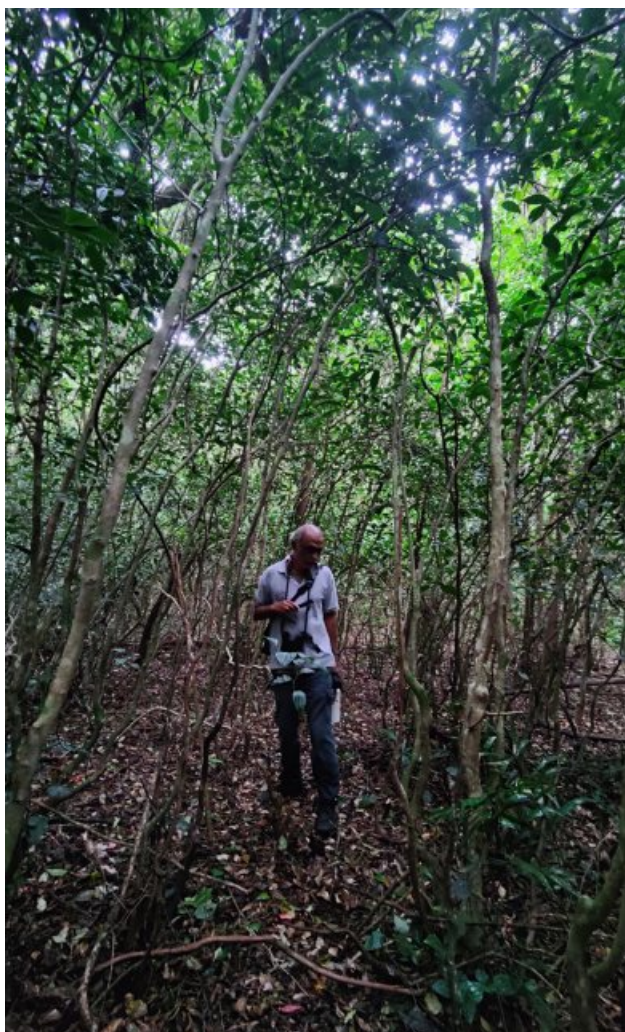
After a simple lunch, we continued and reached the Netterikkal Tea Estate, where the old bungalow in which the British novelist Somerset Maugham had once stayed remained in good condition. The forest around it looked degraded, but the tea plants were still there, having grown even taller than what we had seen in 2008. Many had also died, though, which had reduced the density of the clumps and, in turn, allowed other species to colonise the gaps, of which there were plenty.

As it was getting dark, we hurried on to Chinnamanjulai Tea Estate, at approximately 1,100 m, reaching it by 6:30 pm after walking almost 17 km. The next morning, we walked around and found it hard to spot any *Lantana*, unlike in 2008, since naturally regenerating forest trees had taken over the place and hidden the few remaining tea bushes beneath them. The tea was almost gone in the drier parts, while the heavy machinery once used to process it lies rusted. We left Chinnamanjulai for a downhill trek through dry forest, passing plenty of bear droppings full of mango seeds, until we reached the Nambikovil Check Post.

Overall, the trek gave us valuable insight into how the forest recovers and takes over once left alone. It only requires protection, and we imagine the same recovery unfolding over the decades ahead for the recently abandoned BBTC tea estates.

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Chop chop gang: clearing tea bushes to bring back native forests

The southern Western Ghats, in particular, are known for their high species diversity and endemism. They are considered a refugium, an evolutionary museum, and a cradle of speciation because of their rugged topography and high year-round rainfall. However, during British rule, large areas of tropical evergreen forest were cleared for coffee, tea, and cardamom cultivation, resulting in fragmented habitats with limited corridor connectivity. One such case is the Bombay Burmah Trading Corporation (BBTC) estate, which covers 3,391 ha, of which 2,230 ha are used for tea, coffee, cardamom, and eucalyptus plantations. While the lease ends in 2028, the estate was shut down in August 2024 and officially handed over to the Forest Department in July 2026.



For our project, the objective is to develop a Detailed Project Report (DPR) to guide the restoration of abandoned tea estates in the Kalakad–Mundanthurai Tiger Reserve. We focus on monitoring the recovery of plants, birds, and mammals in the tea plantations and establishing pilot restoration sites to understand the role of tea and shade trees in the colonisation of native species through both passive and active restoration.

Since April 2026, we have been establishing restoration demonstration sites measuring 10×60 m, covering an area of 0.06 ha each. The sites were carefully selected to capture variation in elevation, slope, and slope orientation. As part of the treatment, chainsaws are being used to efficiently clear 50–90-year-old hard tea bushes from a 10×30 m area, while the tea bushes in the remaining portion of each site are left untouched. In the long term, we will monitor the recruitment, growth, and survival of woody plant species to assess the effectiveness of different restoration treatments under varying topographic conditions.



Natural succession is already taking place in the abandoned tea plantations, with pioneer or gap woody plant species such as *Clerodendrum infortunatum*, *Macaranga peltata*, *Litsea wightiana*, and *Litsea insigne* beginning to establish. These species are typically associated with the early stages of succession following disturbances, such as tree-fall gaps in tropical evergreen forests. An introduced species, *Solanum erianthum* or *S. mauritianum*, which is recognisable by its kerosene-like smell, is also present. During the restoration process, we are retaining these pioneer and gap species rather than clearing them. Many of these species have large leaves that provide shade, while their leaf litter adds organic matter to the soil. Together, these processes help create favourable conditions for the natural regeneration of primary forest tree species and support enrichment planting. This is consistent with ATREE's long-term tropical evergreen forest dynamics monitoring data from three 1-ha sites in Kakachi, monitored at five-year intervals between 1995 and 2021, which show that these pioneer species tend to regenerate, grow, and die faster than other species.

The Chop Chop Gang includes Ganesan, Chian, and me, who set up the sites using a lensatic compass to align *Eucalyptus* or *Ochlandra* poles in a straight line and establish the 10 × 60 m plots. Ajith and Boothathan clear the grass and ferns around the base of the tea bushes, making way for Akhil and Madsamy, who use chainsaws to remove the tea bushes from the 10 × 30 m treatment area.

But, like any good gang, the Chop Chop Gang has its share of challenges. Chainsaws break down, tea bushes stubbornly sprout back, and the prickly thorns of *Solanum* make the work more difficult. And then there are the unexpected visitors, the elephant and wasp gangs, whose surprise inspection raids, unsolicited feedback, and, of course, five-star ratings keep us on our toes.

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Role of the avian community in seed dispersal and ecosystem restoration

Forest regeneration is a complex process influenced by multiple factors, including soil conditions, climate, disturbances, and biotic agents such as birds and mammals. Birds play a crucial role in this process by facilitating seed dispersal and regulating insect populations, thereby enhancing vegetation recovery and maintaining ecosystem stability.

In our study, we quantified avian diversity across tea plantations and forest habitats through six months of surveys conducted in the Nalumukku to Kuthiraivetti tea estates and along the Kodayar roadside forest in KMTR. Bird surveys were carried out from August 2025 to March 2026. At each sampling station, point counts were conducted at six points, three inside the forest and three extending into the plantation, arranged perpendicular to the forest edge, with points spaced 500 metres apart. Sampling stations themselves were spaced 1 km apart to minimise the possibility of counting the same individuals at neighbouring stations. Birds were observed and counted for 10 minutes at each point using the point count method within a 50-metre radius. Surveys were conducted between 06:00 and 09:30 under fair weather conditions and were not carried out during fog, strong winds, or rain.

The results revealed that bird diversity was significantly higher in forest habitats than in tea estates. Species were categorised according to their primary dietary guilds, including frugivores and nectarivores, insectivores, granivores, and predatory or scavenging species. In contrast, tea plantations supported lower overall

diversity but higher abundances of a few species across different functional groups, including insectivores that contribute to pest predation, granivores involved in seed predation, frugivores that aid seed dispersal, and predatory or scavenging species that help regulate prey populations.

During the tea estate surveys, species such as the Square-tailed Bulbul (*Hypsipetes ganeesa*), Red-whiskered Bulbul (*Pycnonotus jocosus*), Rufous Babbler (*Argya subrufa*), and Scimitar Babbler (*Pomatorhinus* sp.) were among the most abundant and frequently observed, indicating the dominance of generalist and edge-adapted birds in plantation landscapes. The reduced diversity of functional groups in tea estates suggests a simplified ecological structure compared to forest habitats.

Understanding these differences is essential for conserving avian biodiversity and maintaining ecosystem services such as pollination, seed dispersal, and pest control. Although tea plantations can support a notable number of bird species, their diversity, abundance patterns, and community composition differ significantly from those of natural forest ecosystems.

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Life in the canopy: a closer look at the Lion-tailed macaque

During our recent field visit for the Natural Science Methods course at ACCC, we spent a day inside the Kalakad-Mundanthurai Tiger Reserve. The wet evergreen forest here had closely packed trees, with soft light filtering through the leaves. At a higher elevation, the air felt cooler and more humid than the dry heat back at ACCC.

High in the canopy, we spotted the lion-tailed macaque (LTM). It moved effortlessly from branch to branch, rarely coming down to the ground. Its glossy black fur and distinctive silver-white mane made it easy to recognise. At times, it sat quietly, calmly eating or simply observing its surroundings. At other moments, it moved swiftly through the treetops and disappeared into the dense foliage.

The LTM is found only in the Western Ghats, making it an endemic species. It is also listed as Endangered on the IUCN Red List, largely because of habitat loss and fragmentation. Roads, agriculture, plantations, and human settlements have broken once-continuous forests into smaller patches. For a highly arboreal species like the lion-tailed macaque, this poses a serious challenge. They depend on connected forest canopies to travel, forage, and avoid predators. As forests become

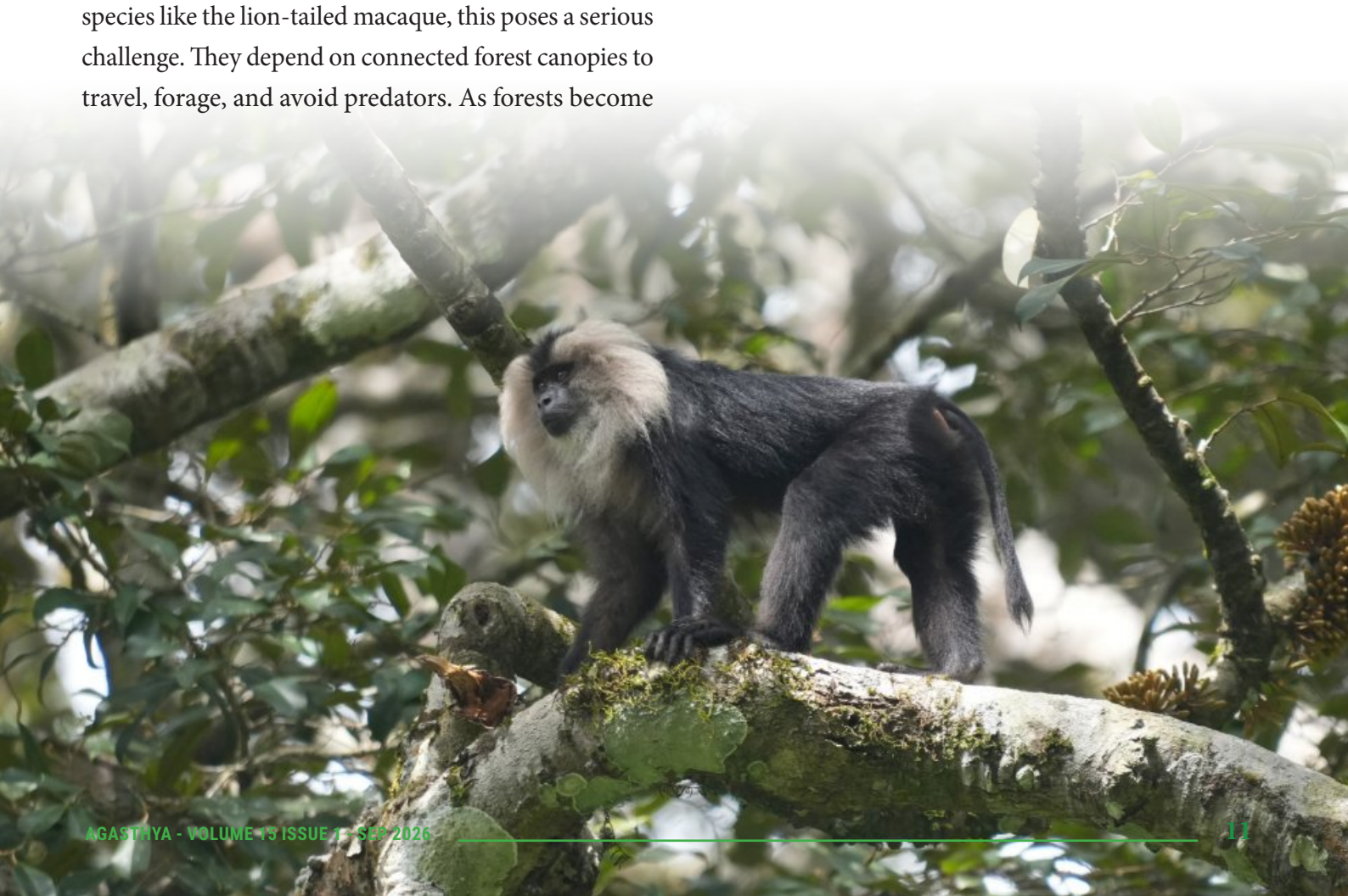
fragmented, groups can become isolated, reducing opportunities for movement and breeding, and making long-term survival increasingly difficult.

Dr. T. Ganesh, our instructor for the course, explained the macaque's close association with the *Cullenia exarillata* tree, an important food source in the wet evergreen forests of the Western Ghats. Its fruits are large, woody, and difficult to open, but the macaques skillfully tear them apart to reach the nutritious flesh inside. While feeding, they also disperse the tree's seeds, illustrating the important ecological relationship between the macaques and the forest.

Protecting the lion-tailed macaque is not just about conserving a single species. It also means safeguarding the continuous rainforest habitat and the ecological interactions that sustain it. In many ways, the survival of this remarkable primate reflects the health of the Western Ghats' evergreen forests themselves.

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Unclaimed homes: a cavity paradox and forest recovery in KMTR, Tamil Nadu

During the field immersion component of our MSc coursework in April, my teammates and I worked in the core and buffer zones of the Kalakad–Mundanthurai Tiger Reserve (KMTR), conducting a pilot study to understand the natural regeneration and restoration potential of abandoned tea estates.

While conducting vegetation, bird, and butterfly surveys, and setting up camera traps, I encountered more than 70 trees with naturally formed cavities, hollowed trunks, wounded branches opening into dark chambers, and decaying, scarred trees holding space. What was particularly interesting was that the bird transects revealed a diverse assemblage, but one largely composed of species that were not secondary cavity-nesting birds. I had expected to sight hornbills, owls, and other secondary cavity-nesting birds. Instead, the most common observations included the Square-tailed Bulbul, Greenish Warbler, Crimson-backed Sunbird, and many others, all of which primarily occupy the canopy and foliage.

Mammal sightings showed a similar pattern, with records dominated by large terrestrial species such as elephants, gaur, and large carnivores. Civet scat was recorded multiple times during transects, and the Malabar Giant Squirrel was also observed, yet I

found no evidence of cavity use during the surveys. These observations pointed me toward an important ecological question: the apparent lack of cavity use may reflect not a scarcity of suitable nesting and roosting sites, but rather relatively low use of available tree cavities by cavity-dependent fauna.

Perhaps these “unclaimed homes” reflect a forest that is still in recovery. Although cavities were abundant, I hypothesise that many specialist cavity users, such as hornbills, owls, squirrels, and the Nilgiri marten, require older trees, stable interior forest habitat, and greater ecological security before they begin using these cavities regularly. It is also important to consider what remained unseen. Many nocturnal or cryptic species may have gone undetected during daytime surveys, and not all cavities are functionally suitable. Intermittent or seasonal use, combined with observation timing, detection bias, and differences in cavity quality, further complicates these observations, making this cavity paradox one that warrants deeper investigation.

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The other side

Early this summer, we climbed onto our trusted field vehicle and set off towards the Tiger Reserve. As we reached the check-post, we waited to be waved through, feeling a quiet sense of excitement and anticipation as we entered what felt like a roadway into the unknown. Soon, a thick green blanket wrapped around us, and the greens deepened into darker shades with distance. The road was bumpy and almost empty, and with our eyes fixed on the hairpin bends, we made our way to the tea estates.

The estate, dotted with rows of blue-doored workers' homes, came into view along the slopes. A few curious onlookers watched our jeep as we stopped for tea at Nalumukku. Before I settled in for tea, a wild boar passed by the bus stop. To my surprise, no one around seemed startled; they simply carried on as if it were an everyday occurrence. These inevitable encounters with wildlife offered a small glimpse into what it means to live in the mountains.

In the coming days, as we sat for interviews, wild boars would pass by, startling me, though the people who had lived there all their lives wouldn't bat an eye. They would simply shrug and say, "pazhakkam aayiduchu (we are used to it)."

As the days unfolded, stories of a deep reverence for this landscape emerged. One person recalled, and even showed us, the act of bowing before the tea plantation before beginning the day, thanking it for sustaining them throughout the years. One day, while walking with one of the former estate workers, I noticed how effortlessly she read the landscape. She could sense the presence of elephants from the state of the dung, casually point out the different varieties of tea in the estate, the usual corners where monkeys would gather, and spots to pick fruits along the way. To her, the place

was far more than a mere workplace.

Later, at a tea shop in Oothu, the display of photos that hung on the wall caught my eye. Among them hung a photograph of a Nilgiri langur beside a young man. The tea shop owner proudly said that, years ago, a young langur had wandered into the estate after becoming separated from its parent, and the man had raised it until the forest authorities advised him to let it go.

During those interactions, I felt that a connection to a landscape is built in the memories it holds, be it

calling out to a friend from across the opposite rows, knowing when the mist will roll in, or sharing spaces with the non-human. The closure of the estate extends far beyond the loss of a workplace, and colleagues who had researched here for a long time described it as the fall of a *periya samrajyam*, a large kingdom.

We ended up listening because we did not have answers when they asked whether anything could be

done. I found myself wondering what it would mean to be barred from returning to a place I had once called home, or from paying my respects to those I had lost. The uncomfortable reality is that closing an extractive economy like the plantation comes at a cost. There is no easy win-win outcome here. Instead, we are left with the difficult task of confronting an uncertain future for those who have long inhabited these landscapes. The workers remain on the other side of legal judgements, factory closures, and environmental protection measures.

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Two fields, two philosophies

The paddy fields of the Tamiraparani floodplain are among the defining landscapes of the Agasthyamalai region. Every growing season follows a familiar rhythm. A gentle breeze ripples across emerald green fields before they gradually turn golden with ripening grain. Soon, the tranquillity gives way to the roar of monstrous harvesters sweeping across the fields. Close behind them follow flocks of cattle egrets, once faithful companions of grazing cattle, now feeding on insects and frogs flushed from the stubble by the machines. Nature, like farming itself, quietly adapts.

One such day, while documenting farming practices across the landscape, we met a farmer who had converted much of his paddy land to jasmine. His explanation was simple: paddy no longer paid; jasmine did. As he sprayed his crop, he effortlessly listed the pesticides he applied, often twice a week. When we asked whether he used protective gear, he laughed. “I’ve never worn a mask,” he said. “I’ve been doing this for decades.” After spraying pesticides, he would sometimes develop a headache, which he treated with antibiotics, herbal tea, and a night’s sleep.

Yet there was much more to his story. He had learnt to survive by constantly diversifying, shifting from one

crop to another as markets changed. In his jasmine field, he cultivated four varieties of jasmine, *Mallikai*, *Pichi*, *Mulla*, and *Kakada*, that flowered across different seasons of the year. Mallikai bloomed profusely during the summer, while Pichi, Mulla and Kakada continued to flower during the rainy and winter seasons. This staggered flowering pattern ensured a continuous harvest, providing him with a stable source of income throughout the year. The additional income had enabled him to secure his family’s future. Alongside farming, he reared cattle on village commons. Then, almost unexpectedly, he introduced himself as the village “doctor.” He moved effortlessly between the names of common allopathic medicines and medicinal plants, revealing a remarkable blend of practical knowledge acquired over a lifetime.

It would have been easy for us to define him by his pesticide use. But that would have overlooked the realities he navigated every day. By local standards, he was a successful farmer, adapting continuously to changing markets while many paddy farmers around him struggled to remain viable.

Barely five kilometres away, in Kallidaikurichi, we met another successful farmer whose philosophy could not





have been more different. Cultivating less than two acres, his organic farm lay surrounded by conventionally managed fields. He spoke of declining soil health, rising cultivation costs and the hidden health burden of chemical-intensive agriculture. When asked about his motive for opting for organic farming, his reply was, “The rice he produces is not poisonous to people.” Through years of perseverance, he earned organic certification and built a loyal customer base that valued his organically grown rice.

Labour shortages and non-chemical weed management remained his biggest challenges. He sold his harvest gradually based on customer demand, often offering free samples to build trust. He encouraged customers to let the women of the household taste and choose the rice variety best suited to their family.

What impressed us most was not simply that he practised organic farming, but how he thought about change. When we asked how other farmers could be encouraged to adopt organic practices, he did not suggest abandoning conventional farming overnight. Instead, he urged them to begin with a small experiment by setting aside a corner of their land to grow food organically for their own families. “People must experience the difference themselves,” he told us. “That is how change begins.”

As we drove back through the fields, we realised that the two farmers were not opposites as much as they were different responses to the same uncertainty. One relied on markets, diversification and constant adaptation. The other placed his faith in ecological principles, patience and conviction. Both had found ways to make farming work under increasingly challenging conditions.

As ecologists, we often search for clear answers. Farmers rarely have that luxury. Their decisions are shaped simultaneously by markets, weather, family responsibilities, health, tradition and hope. Fieldwork reminds us that agriculture rarely conforms to the binary of conventional versus organic, just as landscapes rarely fit simple ecological categories. Rather than asking which philosophy is right, perhaps the more important question is what each can teach us about building resilient farming systems in an uncertain future.

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Fences, hedgerows, and what we began to notice

In June 2025, as part of our coursework, my team and I travelled to the buffer zone of the Agasthyamalai landscape. We arrived expecting to study farms, but we left thinking more closely about edges.

Our focus was on fences that mark boundaries between fields and surrounding vegetation in Singampatti and Pappankulam villages. We repeatedly encountered two kinds of fences. Some were living hedgerows, dense, uneven, and often made up of mixed shrubs and climbers. Others were wire-mesh fences, tightly stretched and largely bare. Farmers explained their choices in terms of crop protection, but our attention stayed on what we could observe along these boundaries.

Across five days of fieldwork, we walked the same transects in the morning and evening, recording insects, spiders, and reptiles consistently. Certain observations stayed with me because they were repeated across sites. Along hedgerows, we frequently encountered orb-weaver spiders between branches, their webs catching the early light. Ant trails were common along stems and at the base of shrubs, often moving between flowering

points. We also recorded grasshoppers resting on leaves and small beetles clustered near flowers. On a few occasions, skinks darted into the thicker vegetation when we approached, using the base of the hedgerow as cover. Butterflies were more active along hedgerows with abundant flowering. We paused several times to watch them move between plants rather than across open ground.

However, these observations were not consistent across all hedgerows. Some transects with sparse or recently cut vegetation had noticeably less activity.

Wire-mesh fences presented a different pattern. We still recorded ants, a few beetles, and occasional spiders attached to the metal itself, but webs were fewer and often smaller. The ground near these fences was more exposed, and we rarely observed reptiles using these edges for cover. Movement felt more intermittent, with fewer places for organisms to settle or remain concealed.

What became clearer over time was that these were not just differences in species presence, but in how species used space. Hedgerows offered surfaces, shade, and plant structures that supported repeated observations of foraging, resting, and hiding, while wire-mesh fences functioned more as barriers than habitats.

As we later discussed our field notes and compared them across transects, we realised that even within a short study period, species-level observations helped us see these edges differently. The variation we recorded was not only about which species were present, but also how consistently they interacted with the boundary itself.

This field experience shifted how I think about restoration. It is not only about adding elements to a landscape, but about recognising which existing structures support everyday ecological use and which ones do not.



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Exploring the hidden world of bats in Tirunelveli

The sun sets far in the west behind the Agasthyamalai ranges of the southern Western Ghats, leaving warm shades of orange and crimson across the horizon. I sit near the Narambunathar Temple in Thirupudaimaruthur village, listening to the rhythmic chanting of prayers to Lord Shiva, when suddenly my view of the sunset is interrupted by mysterious flying creatures overhead.

With their vast wingspan, chestnut-brown fur, dog-like faces, sharp claws, and noisy, chaotic flight, Indian Flying Foxes (*Pteropus giganteus*) fly in groups of thousands in search of food. These remarkable animals are nocturnal, frugivorous, and remain relatively understudied. Watching them left my mind filled with questions. What other bat species occur in this region? Where do they roost, and how do they choose suitable roosting sites? What do they eat? How do they communicate? Many more questions followed.

Driven by curiosity, I joined fellow researchers from ATREE to explore the hidden world of bats in Tirunelveli. With a jeep arranged by the ACCC team, we travelled across villages and surrounding landscapes, searching a wide range of potential roosting sites. We surveyed abandoned houses, bridges, storehouses,

temples, canals, caves, and other natural and human-made structures where bats might be found.

We ventured into some of the most challenging and foul-smelling places in search of bats and documented seven species in the study area. We observed fruit-eating species such as the Indian Flying Fox and the Fulvous Fruit Bat, along with several insectivorous species, including pipistrelles, free-tailed bats, mouse-tailed bats, and leaf-nosed bats, as well as the carnivorous False Vampire Bat. We also recorded the characteristics of their roosting sites and attempted to unravel the puzzle of their communication, but many of our questions remained unanswered.

This experience highlights how much of bat diversity and behaviour remains understudied, even in biologically rich landscapes such as the Western Ghats. These remarkable mammals deserve greater scientific attention, not only to uncover the mysteries of their lives but also to ensure their conservation in a rapidly changing world.

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Narambu: the man who turned a sandbank into a riparian forest

Imagine a place where paddy fields stretch as far as the eye can see, and where people's lives depend closely on the soil and water. This is the village of Thirupudaimaruthur, where the Tamiraparani River turns northward after its confluence with the Gadana River. The great Tamil poet Kambar praised this river and its golden sands, which act like a natural sponge, holding and filtering water.

But protecting this riverbed required sustained effort. It had two key guardians: Justice Rathnavel Pandian, who helped lead efforts to establish India's first bird conservation reserve, and Narambu, a man of action who dedicated much of his life to protecting the riverbanks on the ground. Narambu's story is not just about planting trees; it is also about resisting sand mining to protect the river.

For Narambu, this commitment had its roots in his mother, Pappammal. She had endured several miscarriages and yearned for a child. One day, while walking along the sandbanks, she found six tiny *Ficus religiosa* (Arasu) saplings growing from bird droppings. She saw this as a divine sign. She carefully transplanted the six saplings together near her home and made a vow to Lord Narambunathar Swamy: if she were blessed with a child, she would nurture these trees like her own children. When her child was born, she named him Narambu after the deity. At a time when ritual practices can sometimes leave old clothes and waste in rivers, Pappammal's ritual took a different form: she planted and cared for trees.

Narambu grew up watching his mother care for those trees. By the early 1990s, rampant sand mining was stripping riverbeds across Tamil Nadu, threatening groundwater and agriculture. Narambu understood that the loss of sand would also threaten the village's future. Working alongside Justice Rathnavel Pandian, he developed a simple idea: if a forest could be established along the riparian zone, it would become harder to remove the sand. His efforts faced repeated setbacks. He began planting in 1991 with 100 saplings



but encountered strong opposition from cattle owners. Some of the saplings were uprooted, and a major flood in 1992 washed away many of those that remained. He later joined the Forest Department as a Forest Watcher, gaining the institutional support needed to continue the work. Between 1996 and 2006, along a 3-km stretch of the river, he planted more than 10,000 native trees. Narambu's work also extended to the birdlife of the riverine landscape. As a Forest Watcher, he became closely involved in protecting Painted Storks. During the breeding season, chicks frequently fall from nests high in the trees, particularly during strong winds. Narambu rescues these fallen chicks. For over a decade, he has turned his home into a makeshift rehabilitation space for injured birds, feeding rescued chicks with fish caught from the Tamiraparani River until they are strong enough to fly.

Today, the sandy riverine areas where he once walked with his mother have become a dense riparian forest. The six trees his mother planted have matured into large trees, while the more than 10,000 trees planted through Narambu's efforts have helped create a thriving riverine ecosystem. The area is now also used for cattle grazing, and Painted Storks collect nesting material from the riparian forest.

Narambu remains the living bridge between ancient tradition and modern conservation, a man who turned a mother's prayer into a forest that breathes for us all.

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Namma ooru nandavanam: reviving sacred gardens

In Tamil Nadu, the relationship between people and plants runs deeper than everyday use. It is woven into culture, literature, and spiritual practice. Sangam literature captures this intimacy well: in Natrinai, the protagonist addresses the Punnai tree as her sister. That same closeness persists today, with trees like Arasu, Aal, Vembu, Iluppai, Punnai, and Panai still holding cultural and religious significance across the state.

Nowhere is this relationship more fully expressed than in the traditional temple garden, or Nandavanam. These sacred gardens once stood at the heart of temple life, supplying flowers for worship and medicinal plants for the community. Nandavana Kudis, entrusted with their upkeep, tended the gardens and prepared daily garlands for ritual use. Every temple,

in turn, had its own *Sthala Vriksha*, a sacred tree bound up with the deity and the temple's identity.

The significance of Nandavanams extends well beyond the spiritual. These native-tree groves double as ecological refuges, offering food, nesting, and roosting sites to birds, bats, insects, and other wildlife. At the Narambunathar Temple in Thirupudaimaruthur, the Nandavanam sustains large colonies of fruit bats alongside numerous waterbirds. A 2021 survey of 131 ancient temples in Tirunelveli found 3,664 trees across 97 native species, a striking reminder of the botanical heritage still quietly surviving within temple landscapes.

Yet this heritage is under strain. Neglect, encroachment, concrete paving, and the steady replacement of native species with ornamental or commercial plantations have caused many temple gardens to shrink or vanish altogether. Several culturally significant trees are now becoming rare.

In response, ATREE partnered with the Hindu Religious and Charitable Endowments Board (HR&CE),

along with local organisations and communities, to launch Namma Ooru Nandavanam in 2021. The initiative rejuvenates temple gardens by reintroducing native and culturally important species, with particular attention to those at risk of disappearing. Gardens in eight temples across Tirunelveli have been restored so far, creating spaces for biodiversity

conservation, environmental education, and community engagement.

To revive a Nandavanam, then, is not simply to plant trees. It is to restore a living connection between people, plants, culture, and nature, and to ensure these sacred green spaces continue to flourish for generations to come.



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Rethinking restoration in a changing river

I remember standing along the banks of the Tamiraparani River, expecting a river that matched its reputation as beautiful, perennial, and life-sustaining. Instead, I encountered a river carrying both visible and invisible signs of stress. Fragments of ritual material moved with the current, while shifts in flow and depth hinted at deeper transformations. Over time, it became clear that these changes are not isolated. Ritual practices, altered by new materials, now leave behind persistent waste. At the same time, infrastructure such as anicuts and intake structures interrupts the river's reshaping its bed and creating uneven, sometimes unsafe conditions. The Tamiraparani today is not just an ecological system, but a changing social and physical landscape.

This raises a fundamental question when planning its restoration. Restoration must ask: for whom, and to what end? Is the goal to return the river to a historical ecological baseline, defined by biodiversity and water quality? Or is it to sustain a river that people can safely access, culturally engage with, and continue to depend on?

Too often, restoration is framed narrowly, focusing only on checklists, flow regimes, or pollution control. But the Tamiraparani shows that such approaches may be incomplete. The river is a living, breathing system, not just a resource to be measured. Communities that interact with it do not see themselves as separate from it, and restoration efforts that overlook this relationship often remain disconnected from practice.

In a changing river system, restoration cannot mean returning to a fixed past. It must become a negotiation of the present and the future, where ecological function, cultural meaning, and human safety are considered together. This may mean rethinking the materials used in rituals, redesigning infrastructure, or integrating lived experience into scientific planning. The goal of holistic conservation should be to foster stewardship of the river. Restoration is not just about repairing it, but about deciding what kind of river we are shaping and for whom it is meant to endure.

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Listening to the smallest voices: the story of wetland health in the Tamiraparani landscape

“Only if we understand, can we care. Only if we care, will we help. Only if we help, shall all be saved.”

— Jane Goodall

The Tamiraparani River, born in the evergreen forests of the Agasthyamalai Hills, supports life for countless organisms. While we often admire the river's beauty, we rarely notice the tiny creatures beneath its surface.

Aquatic insects and other macroinvertebrates are nature's silent messengers, revealing whether a water body is healthy or under stress.

The first time I looked closely into an irrigation tank in the Tamiraparani landscape, I wasn't searching for birds or fish, as I usually did. Instead, I searched beneath the muddy water. There, I found forms of

life that were easy to overlook. At first, they seemed insignificant. But the longer I watched, the more I realised that these tiny creatures held clues to the condition of the wetland.

My journey into this hidden world truly began with my guide, who taught me that nature often whispers its greatest secrets through its smallest creatures. Eager to understand this unfamiliar world, we travelled to Nachiyarkulam with collection trays, forceps, and endless curiosity. We spent time searching through mud, leaf litter, and shallow water, expecting to find a rich diversity of aquatic life. Instead, we found only about eight species of macroinvertebrates. Most were pollution-tolerant, while species that require clean, well-oxygenated water were noticeably absent, an indication that the wetland was under ecological stress. As I read more about macroinvertebrates, I learned that different species have different tolerances to water

quality. Sensitive groups such as mayflies, stoneflies, and many caddisflies thrive only in clean, oxygen-rich water, whereas others can survive in polluted, low-oxygen conditions. Because of these differences, scientists use macroinvertebrate communities as biological indicators of freshwater health. They also form the foundation of freshwater food webs, providing food for fish, frogs, dragonflies, and many birds.



One organism, the red bloodworm, particularly caught my attention. Much like blood can signal an injury in the human body, an abundance of red bloodworms can indicate that a wetland is under stress from pollution, sewage, or excess organic matter.

Their bright red colour comes from haemoglobin, which allows them to survive in oxygen-poor water. Their presence does not mean a wetland is dead, but it serves as an early warning that intervention is needed before the damage becomes severe.

Wetland restoration is not just about planting trees or removing plastic waste. It is about restoring the ecological conditions that allow even the smallest forms of life to flourish. By listening to these tiny storytellers, we can observe changes in wetland health long before they become obvious to the human eye. To restore Tamiraparani, we must first learn to listen to its smallest voices.

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Restoration is a relationship: listening to communities in tank ecosystems

There is a particular kind of silence that fills an irrigation tank when the water turns unhealthy. The birds still arrive, lotus still spreads, and people still walk along the bund, but the relationship between the tank and the community slowly begins to break.

During our interactions in villages connected to the Manimuthar Dam 40-foot channel-linked irrigation tanks, villagers shared that government-led management has reduced local participation and that their concerns often go unheard. For them, the most visible outcome is declining water quality. In tanks with dense lotus growth, several residents reported skin irritation after bathing, sometimes severe enough to require injections.

Near Singampatti Therkukulam, an elderly resident shared that the tank water was once clean enough to cook Pongal during Tamilar Thirunaal. Today, they say it is no longer suitable even for cattle. The community still collects water from the tank for funeral rituals, reflecting how deeply intertwined village life remains with the irrigation system.

In Nachiyar Kulam, a tank in the 40-foot channel, people still bathe despite experiencing skin irritation

because they have no other choice. They described foul smells from rotting lotus stems, changes in the water's colour, and pig dung entering the tank. Over time, discomfort has turned into acceptance: "We are used to it."

But hope exists. Aladikulam, a tank restored earlier by ACCC, is now a place where people confidently bathe again. Inspired by this, communities requested that we restore Aiyapanerikulam, another tank. We began by listening through interviews and focus group discussions (FGDs), supported by baseline biodiversity surveys and Differential Global Positioning System (DGPS) mapping. Interventions such as the removal of invasive plants and the repair of bathing ghats and sluices are now being planned based on community priorities.

This work has taught me that restoration is not only about ecology. It is also about access and equity. Importantly, restoration in a human-dominated landscape is a relationship that begins with listening.

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Restoration as a trophic windfall: balancing avian feasts and habitat transitions at Perukulam pond

During ongoing ecological restoration and invasive species clearance at Perukulam Pond, Thoothukudi district, mechanical operations inadvertently triggered a sudden pulse in the local food web. As heavy machinery disturbed dense stands of invasive vegetation, it dislodged terrestrial and aerial insects, creating an immediate feeding opportunity for local bird communities.

Different avian guilds exploited this disturbance in distinct ways. Ground-foraging species such as Cattle Egrets and mynas methodically searched the newly exposed soil for grubs and larvae, and aerial insectivores such as Indian Rollers, Black Drongos, Green Bee-eaters, and swifts darted around the machinery to capture prey flushed into the air. In this sense, invasive species removal temporarily created new feeding opportunities, turning restoration zones into productive hunting grounds for birds.

However, restoration is rarely a clean slate and often involves difficult trade-offs. Removing invasive vegetation can help restore wetland hydrology and facilitate the recovery of native flora, but it can also displace fauna that have become dependent on these

thickets. During the clearance work, we observed wild boars leaving dense *Ipomoea* patches to wander in search of new shelter, while snakes sought alternative microhabitats.

These observations point to the layered nature of restoration work. Restoring a historical wetland state may require disrupting an established novel ecosystem, and managing these transitions calls for careful phasing of activities. We must create space for native biodiversity to recover while also accounting for the impacts on resident wildlife.

Documenting these fine-scale dynamics underscores the importance of attentive, on-the-ground monitoring during restoration projects. By closely observing how birds and mammals respond to machinery and habitat changes, we can refine restoration practices and better anticipate their short-term effects. Balancing immediate wildlife disruptions with long-term ecological benefits ensures that our restoration efforts are as compassionate as they are scientifically sound.

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Wetlands are blooming, but at what cost?

Not all ecological damage looks like loss. Sometimes it disguises itself as a gain, since these shifts are gradual and often tied to how we use ecosystems over time. Wetlands, for instance, support rich biodiversity and provide many ecosystem services to people who depend on them, which is partly why the changes they undergo, which are often context-dependent, are rarely seen as urgent enough to demand immediate attention.

One example of this is in the Tirunelveli district of Tamil Nadu, where the cultivation of the lotus (*Nelumbo nucifera*) has gradually encroached on small wetlands. What might look like a productive use of space for some has started to alter these systems in less visible ways. As thick lotus mats spread across the water, they reduce light penetration into these water bodies. Over time, as plant material accumulates and decomposes, dissolved oxygen levels drop, and water quality begins to decline. This is compounded by the addition of urea as a fertiliser for the lotus, which further increases nitrogen levels, putting additional stress on aquatic plants and animals.

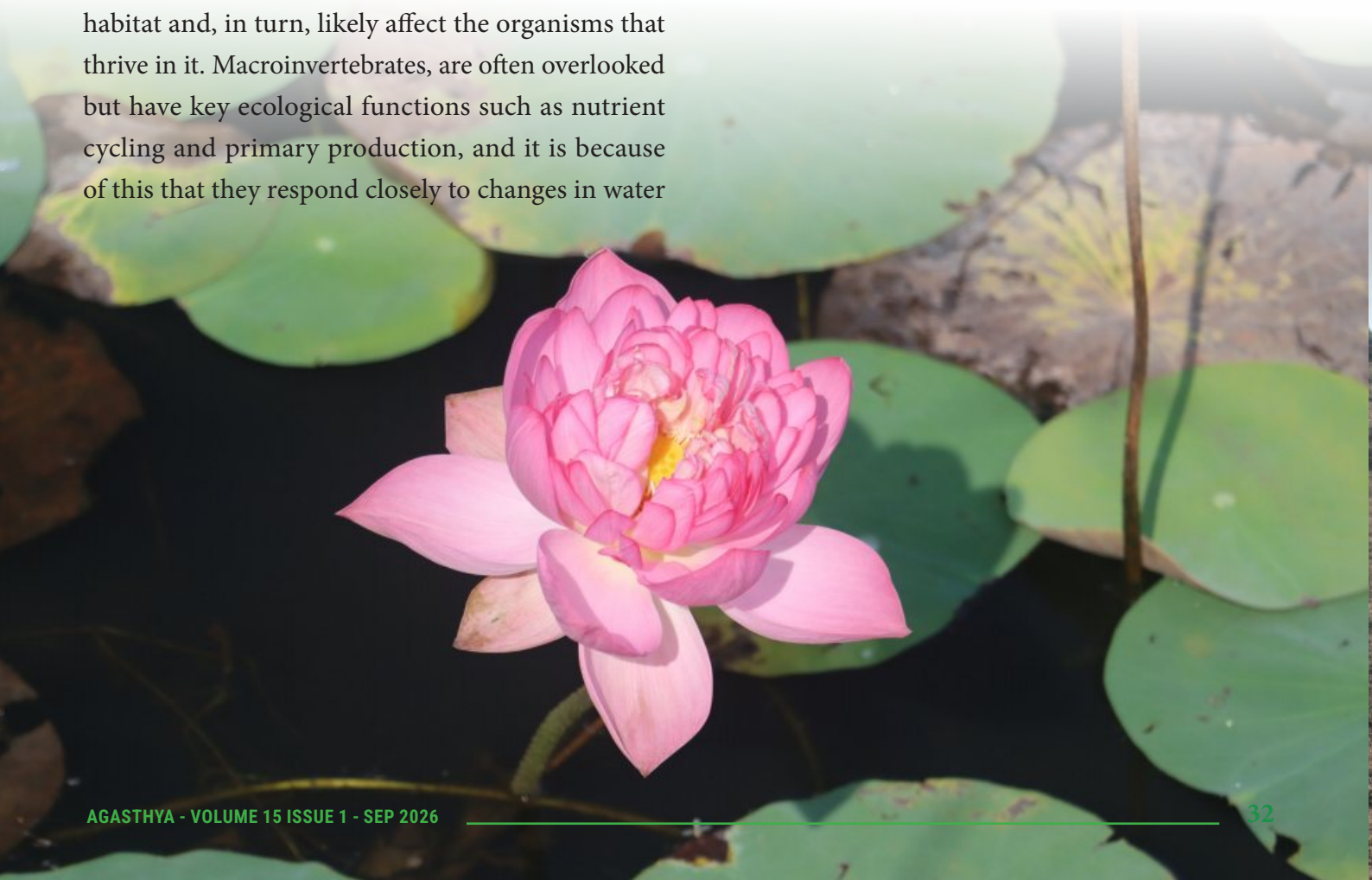
These physical and chemical changes alter the wetland habitat and, in turn, likely affect the organisms that thrive in it. Macroinvertebrates, are often overlooked but have key ecological functions such as nutrient cycling and primary production, and it is because of this that they respond closely to changes in water

quality and habitat structure. So although patterns in their diversity may vary, they can offer early signs of ecological change that can be hard to notice otherwise. This points to a larger issue: species introduced or encouraged for economic reasons can create difficult trade-offs between short-term benefits and long-term ecological health. Managing wetlands in such contexts, then, calls for a better understanding of freshwater systems and the roles different organisms play within them, since conservation and restoration efforts must be based on evidence, including data on the variety of functions within biological communities.

Balancing people's livelihood needs with ecological health is not easy. However, recognising these subtle but important changes is a necessary first step in creating context-sensitive wetland management systems.

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Wings in the weeds: tracking moth diversity before and after habitat clearing

Moths are important indicators of ecosystem health, and their diversity varies widely across landscapes and seasons. As part of a grassland restoration project, I led the ATREE team to survey moth diversity before and after habitat restoration. The study focused on two contrasting sites: one dominated by *Dodonaea viscosa*, which had invaded much of this dry grassland, and an open grassland where local people grazed their cattle and goats.

The decision to remove *Dodonaea* was driven by both ecological and community concerns. The shrub had taken over large parts of the landscape, reducing open grazing areas, and local communities wanted it cleared to improve forage for their livestock. Before restoration began, the team carried out a baseline biodiversity survey to document the grassland's existing moth community.

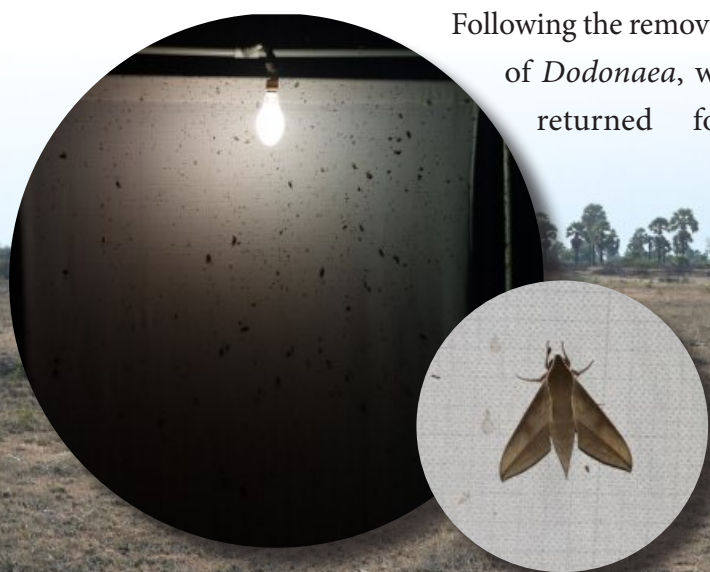
During the first survey on 26 March 2026, the landscape was dry and windy. Moth sampling was carried out using a mercury vapour lamp powered by a small Honda generator, with the light trap operated for four hours after dusk. We recorded a greater number of moth species and individuals in the open grazing land than in the *Dodonaea*-dominated area.

a second biodiversity survey on 18 June 2026. The results revealed a striking change. In the cleared area, moth diversity increased to 36 species and 75 individual moths. Species belonging to the Crambidae (grass moth) family were relatively more abundant than those from the other six families recorded during the survey. In contrast, the open grazing land showed a decline, with only 17 species and 38 individuals documented. *Scirpophaga incertulas* was among the most frequently recorded species, while *Theretra clotho* of the Sphingidae family was also observed.

These changes suggest that the dense growth of *Dodonaea* may have suppressed a diverse understory of host plants or limited suitable conditions for moth movement and activity. Once the shrub was removed, the more open habitat may have provided improved flight corridors, greater light penetration, and better conditions for a wider range of moth species. As *Dodonaea viscosa* continues to dominate parts of the grassland, long-term monitoring across cleared, *Dodonaea*-dominated, and open grazing areas will be essential to better understand how habitat restoration influences moth diversity over time.

Following the removal of *Dodonaea*, we returned for

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Grasslands on the brink: restoring the last remaining grasslands of southern Tamil Nadu

I was caught up with my usual data analysis work at the ATREE office in Bengaluru when Aditya called. “Arjun, looks like one of our grassland monitoring sites is going to get converted soon.”

Aditya was studying how rodent populations in the grasslands of Tirunelveli respond to shrub and tree encroachment. During one of his field visits, he noticed that a couple of the traps were missing and that a large part of the grassland had been mowed down, exposing the barren earth. To be honest, the news of yet another grassland site being converted in the region didn't really take me by surprise. Half a decade of roaming around the grasslands of Tirunelveli, monitoring roosting populations of Harriers, has left me with field notes where some of the commonest phrases are “roost site lost” and “grassland converted.” It was not until another month after Aditya conveyed the news that I visited the site for the yearly synchronised Harrier survey, which was when I witnessed the extent of the destruction: a quarry had come up at the site, and multiple excavators and lorries were routinely moving

helter-skelter. Although some tracts of the grassland remained, the harriers were nowhere to be seen. This was a regular roost site where one could count around 20–25 roosting harriers in the evenings, and their absence was an indication of how the species could not really tolerate changes to these habitats.

And it was not just the harriers. Even the farmers who do small-scale cultivation at these sites were unhappy. One of them mentioned that the large-scale excavations at the site would eventually dry up the borewell he uses, making the area unsuitable for farming in the coming years. Over the years, these habitats have been lost to tree plantations, renewable energy infrastructure, canals, and a number of other developmental activities. These changes are increasingly affecting the rich grassland biodiversity in the region, which ranges from several species of migratory birds and endemic plants such as *Lindernia minima* to animals like the Indian fox and the endemic Madras hedgehog.

Is there hope to conserve the last remaining grassland tracts?





In spite of the large-scale changes that have taken place across the grassland landscapes of Tirunelveli, several patches still remain. Researchers at ATREE's Agasthyamalai Community Conservation Centre (ACCC) have been undertaking a grassland restoration initiative since 2024 on an experimental basis in a 1-ha grassland plot located at Munanjipatti village in Nanguneri taluk. These experiments will help us understand whether active interventions are needed to bring back the grasslands, or whether simply giving the land some protection from further disturbance is enough to allow them to recover. More recently, a couple of harriers were spotted foraging at the site, perhaps early sentinels of a grassland beginning to recover. The return of the grass has also brought pastoralists back, who have begun bringing their livestock to the site for grazing.

However, long-term conservation of these grasslands would require scaling up such restoration programs across southern Tamil Nadu. This is possible only with the involvement of local community members, mainly but not limited to pastoralists and farmers who are dependent on these open natural habitats for their livelihoods. Therefore, the way forward lies in bringing together researchers, local communities, conservation organisations and policymakers to work towards a common goal of restoring and conserving the last remaining grassland habitats.

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A spiny reminder of why grasslands matter

Some wildlife encounters are memorable because of how rare they are, while some stay with us because of what they make us realise. Sometimes we are lucky enough to have both in the same encounter.

I had heard about the Madras hedgehog long before I ever saw one. I had also heard, from a colleague, about a hedgehog killed on the roads, a stark reminder of the dangers wildlife face navigating a landscape divided by roads and human activity.

The sighting came sooner than I expected. Returning from a night survey as part of our grassland restoration work, we were riding a two-wheeler when the faint beam of the headlight caught a small movement at the edge of the road. We stopped immediately; moving slowly through the dark was the tiny, spiny creature I had hoped to see, the Madras hedgehog. Excited, I moved in for a closer look. The moment it noticed us, it curled into a spiny ball, tucking its vulnerable face and limbs beneath its spines. It was a striking sight,

this tiny creature performing its ancient act of defence. Then, slowly, it vanished into the darkness.

Even though the encounter was brief, it left a lasting impression, a reminder of the work we do. The hedgehog's spines may protect it from predators, but they cannot shield it from the slow degradation of its home. Then it struck me: here was a creature so small, so seemingly defenceless, yet surviving amid shrinking grasslands, human disturbance, and the pressure of a changing landscape.

Grasslands are often mistaken for open, empty spaces, but they are home to a remarkable diversity of life. Restoring them means bringing back native vegetation, ecological processes, and the conditions that allow these small, unnoticed lives to persist.

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The role of *Dodonaea viscosa* in grassland ecosystems: a conflict between perception and ecology

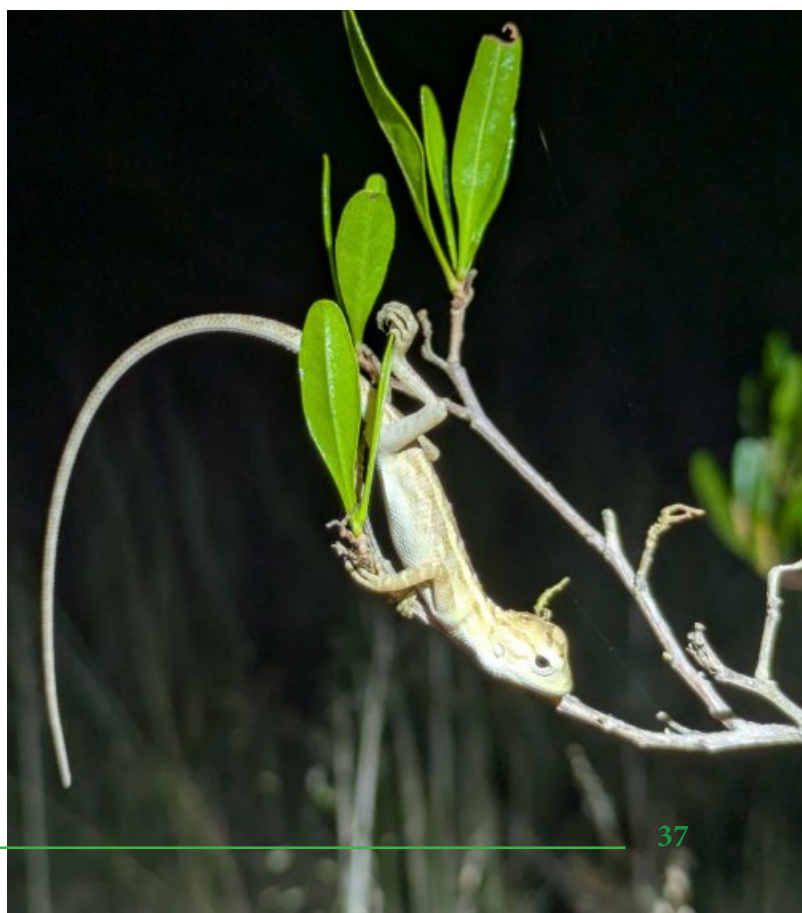
Grassland ecosystems are often valued for their open landscapes and native grasses, which support a wide range of flora and fauna. However, in many such areas, the shrub species *Dodonaea viscosa* has become increasingly dominant.

Many local stakeholders prefer to limit or remove *Dodonaea viscosa*. The plant is often viewed as invasive or undesirable because it alters the visual character of grasslands and can outcompete grasses that are traditionally valued for grazing or aesthetic purposes. As a result, there is pressure to control or eradicate the species from these landscapes. Yet *Dodonaea viscosa* also plays a significant ecological role. It contributes positively to biodiversity by providing habitat, shelter, and food resources for various insects, birds, and small animals. The shrub can also improve soil stability and assist in ecological succession, particularly in degraded or disturbed areas, enhancing ecosystem resilience and long-term sustainability.

The challenge, therefore, lies in balancing ecological benefits with social and economic preferences. Rather than complete removal, a more nuanced management approach may be needed, one that controls the spread of *Dodonaea viscosa* while still allowing it to contribute to biodiversity. While *Dodonaea viscosa* may not align with traditional perceptions of ideal grassland landscapes, its ecological value cannot be overlooked. Sustainable land management should consider both biodiversity conservation and human needs, aiming for a balanced coexistence.

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Life of the dryland: notes from a restoration site

My first experience with a grassland was not as a botanist searching for grasses, but as a participant during the harrier count.

In December 2024, I travelled with the ATREE team to Munanjipatti, Nanguneri taluk, Tirunelveli, for a harrier survey. Until then, I had looked at landscapes mainly through the eyes of a botanist. That evening, however, the grassland revealed another face. As the sun descended, the day's harshness softened. The grass turned golden, the wind grew gentle, and harriers began to gather over the open land. Montagu's Harriers and Pallid Harriers, winter visitors from distant breeding grounds in Central Asia and Russia, arrived one after another at their roost. Watching them settle as daylight faded, I realised that this seemingly quiet grassland was connected to landscapes thousands of kilometres away. As I spent more time observing the grassland, I began to understand that it was not defined by grasses alone. The plants, insects, reptiles, birds and mammals were woven into the same dry landscape. Conversations with Ganesh sir, Saravanan anna and Thalavaipandi anna opened new windows into the grassland. I

began to look beyond the harriers, to the small plants, butterflies, moths and grasses that are easily missed. Saravanan anna introduced me to *Lindernia minima*, *Theriophonum sivaganganum* and *Drosera indica*, small and rare plants that appear during the rainy season and are closely associated with these seasonal grasslands. Their brief appearance reminded me that even a short-lived plant can have an important place in a landscape. While observing the grassland, I found that common grasses such as *Chrysopogon fulvus*, *Oropetium thomaeum*, *Alloteropsis cimicina* and *Panicum* species formed much of the vegetation, creating cover and food for a range of other organisms. Among them grew *Manisuris myurus*, a regionally restricted grass. The endemic *Sitana marudhamneydhal* slipped quietly between the dry stems, perfectly suited to this open habitat. Occasionally, the grassland also offered glimpses of rarer animals. Even Madras hedgehogs can still be encountered in some grassland patches, reminding me that even this seemingly dry landscape provides refuge for species that are seldom seen elsewhere.

One conversation with Ganesh sir stayed with me. He



recalled seeing small Indian foxes in these grasslands several years ago, but told me that they are now much harder to find as the grasslands continue to shrink. He also spoke about blackbucks, whose presence has become restricted to places such as Vallanadu Wildlife Sanctuary in this region. These stories made me realise that the disappearance of grasslands is not simply the loss of vegetation. When the grass disappears, the shelter, food and open space that support an entire community disappear with it.

The more closely I looked, the more the boundaries between species seemed to disappear. Grass supported insects; insects fed birds; vegetation sheltered reptiles and small mammals; predators followed their movements; and migratory harriers arrived with the winter, linking this small landscape of Tirunelveli to distant parts of the world. I had entered the grassland looking for grasses. I left understanding that every species I encountered was part of the same story.

The grassland was not simply a place where life existed; it was a place where lives depended upon one another.

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Restoring ecosystems by restoring relationships: notes from Mundal's shore

Ecosystem restoration is typically measured by hectares reforested, wetlands rehabilitated, or species reintroduced. These metrics matter, but they capture only part of the picture. Ecosystems are social as much as they are biological, sustained not only by ecological processes but also by the daily decisions of the human communities embedded within them. In the fishing villages of Mundal on the Gulf of Mannar, one such decision offers a case study in what might be called relational restoration.

Ecosystem restoration, in Mundal, might not look like a restoration project. It looks like a fisherman standing waist-deep in a net full of fish, finding a turtle tangled among them, and stopping everything to set it free. For instance, Mohammad Bannatwalla, who has fished these waters for eighteen years, describes it plainly: when the fishermen notice something different caught in the net, they immediately release it back into the water to protect it, even if they themselves are tired. There is no one watching, no reward guaranteed. It happens because it has become the obvious thing to do. It was not always so. Murugalingam of Keezha Mundal remembers when dugongs were eaten rather than rescued, a practice that ended roughly ten years ago, after the Forest Department began asking fishers in the Gulf of Mannar to protect, rather than hunt, marine

animals. Jamal, from a neighbouring village, still recalls the taste of dugong meat he ate as a young man, before the rules changed. Today, when a dugong or dolphin surfaces in a net, it is photographed and released, part of a system now formalised under the Gulf of Mannar Biodiversity Reserve, which pays fishers ₹25,000 for a dugong saved and ₹5,000 for a dolphin.

But incentive alone does not explain what is happening on these shores. If you ask Seenik Abdullah, twenty-three, from Valinokkam, why he releases the turtles that land in his net, the answer isn't about money: they are living beings, so they must be allowed to live. He adds that over the years of doing this, neither turtles nor dolphins have ever attacked him; they cooperate with him when he tries to rescue them.

The relationship between community and the environment is not merely a social variable to be managed alongside restoration; it can be a restorative force in its own right. None of this appears in a satellite image. No hectare count captures it. But it is restoration all the same, built one net, one release, one changed instinct at a time.

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The wild schoolyard

The 1% solution to turn school grounds into national habitats

For many children, the schoolyard is where the classroom ends, and play begins. Yet, beyond the familiar buildings and playing spaces, there is often another possibility waiting to be discovered: the unbuilt corners where nature can return. Opportunities for students to step beyond the traditional classroom, to discover, create and celebrate the natural world, are often limited by a lack of resources. ATREE's My Wild Schoolyard (MWS) initiative begins with a simple idea: any unbuilt outdoor space in a school can become a sanctuary for outdoor learning, play and exploration. A schoolyard can be much more than a physical space. Given the chance, it can shape a child's interests, welcome a surprising variety of wildlife and nurture a lasting sense of care for the natural world. Bringing this kind of learning into everyday school life can also contribute to students' physical health, mental well-being and connection with nature.

But creating a 'schoolyard habitat' is not simply about putting plants into the ground. It needs to be ecologically sound, connected to the academic curriculum and cared for over the long term. For it to truly take root, the whole school community has to be involved: parents, students, maintenance staff and administrators alike. As the habitat grows, it can become a small but valuable passage and refuge for local and migratory wildlife, from songbirds and small mammals to reptiles, amphibians and pollinators. Vegetation can also form a buffer along nearby water bodies, helping to reduce pollution reaching local waterways.

The MWS programme also opens doors to learning far beyond the traditional science curriculum. Collecting data and identifying species may be a natural starting point, but planning and caring for a habitat can lead students into research, creative writing and artistic expression. Childhood is when many of the values and perceptions that stay with us into adulthood begin to take shape. A schoolyard alive with biodiversity gives children the freedom to explore and play while offering

them a tangible, everyday lesson in conservation.

The experience at Sacred Heart School in Panagudi, Tamil Nadu, during the 2022–2023 academic year shows what is possible. Through the MWS programme, ACCC improved the school grounds with biodiversity in mind, increasing the number of tree species from 51 to 75. The students became active participants in the process, recording 18 species of butterflies, 35 species of birds and three species of dragonflies. Exposure visits to larger natural habitats gave the students another perspective, allowing them to compare the life flourishing in their schoolyard with the wider landscapes around them and deepen their understanding of ecology.

Could this happen on a much larger scale? India has more than 27,000 government-managed schools, and if every school set aside just one per cent of its land for a "Wild Schoolyard," it could create two square kilometres of protected habitat across the country.

We may begin with something as small as a corner of a schoolyard, but across thousands of schools, those small patches could become places where wildlife finds shelter and children find a deeper sense of belonging to the natural world. More importantly, they could give millions of students a sense of ownership and responsibility towards the living world around them, and help nurture a greener future for the next generation.

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Ecosystem restoration in southern Tamil Nadu: the ASPIRE approach

Ecosystem restoration has emerged as India's foremost environmental priority as the country grapples with widespread land degradation, biodiversity loss, and increasing climate-related risks. Nearly one-third of the country's geographical area has experienced varying degrees of degradation due to rapid urbanisation, deforestation, unsustainable agricultural practices, and invasive species.

Addressing these interconnected challenges requires restoration efforts that move beyond conventional plantation activities to rebuild native biodiversity and restore ecological processes and functions. These efforts must not be restricted to forests; attention is also required for grasslands, wetlands, rivers, coastal ecosystems, and degraded agricultural lands.

The Agasthyamalai Sustainability Project for Integrated Restoration of Ecosystems (ASPIRE), implemented by ATREE's ACCC, exemplifies this integrated landscape restoration approach. Operating across the ecologically significant Agasthyamalai Biosphere Reserve, ASPIRE adopts a multi-ecosystem restoration framework that recognises the ecological connectivity among landscapes and local communities. It aligns with India's national commitments under the Bonn Challenge, the UN Decade on Ecosystem Restoration, and national

missions on biodiversity conservation and climate resilience.

The project combines scientific research with on-ground implementation, restoring forest landscapes in an abandoned tea estate within KMTR, connected water tanks in the Tamiraparani River Basin, and open arid grasslands, while also conducting experiments to nudge biodiversity-positive agriculture and implementing climate literacy initiatives focused on nature-based livelihoods and climate education for children. This work draws on native species recovery, ecological monitoring, hydrological assessments, and long-term biodiversity evaluations. At the same time, ASPIRE actively engages local communities to ensure that restoration efforts are socially inclusive and economically viable.

By integrating ecological restoration with scientific research, stakeholder participation, and capacity building, the project demonstrates how ecosystem restoration can serve as a powerful nature-based solution to address environmental degradation while supporting sustainable livelihoods.

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Kurinji

*Mountains draped in
evergreen forest*



Mullai

*Lowland scrubby and
grassland vegetation*



Marutham

Paddy fields



Paalai

*Desert with red sand
dunes*



Neithal

*Seashore and
mangroves*



Behind the scenes

ASPIRE Project

(Agasthyamalai Sustainability Project for Integrated Restoration of Ecosystems)

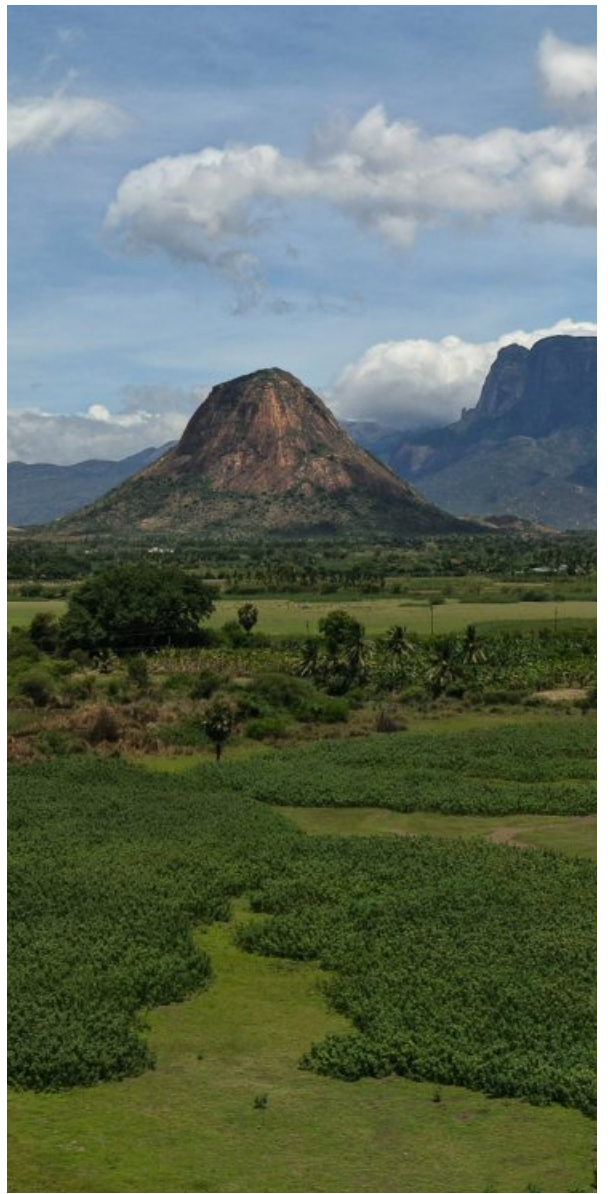
Forest restoration





Wetland restoration





Biodiversity-positive agriculture





Grassland restoration





Climate literacy



News and events

- **BELL PINS – ATREE Conservation Leadership Award** was presented to M. Narambunathar at the District Science Centre, Tirunelveli on 23 January 2026.
- The **Tamiraparani Waterbird Count** was conducted across Tirunelveli, Tenkasi, and Thoothukudi from 23–25 January 2026.
- A **Harrier Count** was conducted across the dry grasslands of Tirunelveli and Thoothukudi in February 2026.
- The **Fish Pocket Guide** was released, followed by the Tamiraparani Fish Count along the Tamiraparani River on 26 March 2026.
- A **Methods Course in Ecology, Sociology, and GIS Mapping** was held at ACCC in April 2026.
- **World Otter Day** awareness activities were held at the District Science Centre in May 2026.
- **National Moth Week** was celebrated at the District Science Centre on 20 July 2026.

Snippets from the field

- A **Scaly Gecko** was spotted in the Munanjipatti grassland on 7 March 2026 by the biodiversity survey team.
- A **Common Sand Boa** was spotted at ACCC on 29 March 2026 by Teresa S. Thomas.
- A ***Platypleura* sp.** (cicada) was spotted at ACCC on 30 April 2026 by S. Thalavaipandi.
- An **Indian Rock Python** was spotted at the grassland restoration site on 23 May 2026 by the Wetland Team.
- A juvenile **Hump-nosed Pit Viper** (*Hypnale hypnale*) was spotted near the Kallaru River at Athri Temple in the Kadayam Range of KMTR on 13 June 2026 by Vinod M. Kumar and A. Thanigaivel.
- A **Rao's Toad** (*Duttaphrynus stomaticus*) was spotted at a grassland restoration site on 18 June 2026 by the ACCC team.
- A **Banded Kukri** was spotted at ACCC on 30 June 2026 by M. Ganesan.
- Five **Dog-faced Water Snakes** (*Cerberus rynchops*) were spotted in the Pazhayakayal mangroves during the International Mangrove Day event on 26 July 2026 by the ACCC team.
- **Sloth bears** were spotted near Krush Mottai (Manjolai) on 4 August 2026 by the Forest Restoration Team during a water-quality assessment in the tea estate.
- A **Great Hornbill** was spotted at Oothu on 5 August 2026 by S. Thalavaipandi and M. Ganesan.
- A **Madras Hedgehog** was spotted at the grassland restoration site in Munanjipatti on 11 August 2026 by the Grassland Team.
- An adult **Fan-throated lizard** (*Sitana marudhamneydhal*) was spotted at ACCC on 25 August 2026 by S. Thalavaipandi.

Interns

- **Anandlakshmi M.** and **Khirsagar Sahu** from Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, and **Kamalesh M.** from The American College (TAC), Madurai, worked on the ASPIRE wetland component in February 2026.
- **Dharshini Priya S.** and **Karthikeyan G.** from Bharathiar University, Coimbatore, worked on the ASPIRE wetland component in June 2026.
- **Jenisha Lantina S., Vijay Ganapathi A.,** and **Bhagya J.** from Madras Christian College (MCC) worked on the Nandhavanam restoration project in June 2026.
- **Jasmine Jeeva Mary D.** from St. Xavier's College worked on ASPIRE agriculture in June 2026
- **Vijaya Sneha Kannan** from Ahmedabad University, Gujarat, worked on biodiversity-positive agriculture in July 2026.
- **Athul Ramesh** from the Indian Institute of Science Education and Research (IISER), Mohali, worked on the ASPIRE grassland component, while **Sidak Singh** from IISER Mohali worked on biodiversity-positive agriculture in July 2026.
- **Shivani K.** from the Forest Research Institute (FRI) worked on the ASPIRE climate literacy component in July 2026.
- **Lakshitha S.** from Alagappa University worked on the ASPIRE climate literacy component in July 2026.
- **Sudarvizhi J.** and **Mythily B.** from the Indian Institute for Human Settlements (IIHS), Bengaluru, worked on the ASPIRE climate literacy component in July 2026.

Contact

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39.76°C

Maximum temperature
on 04 Aug 2026



375 mm

Total rainfall
maximum rainfall on
01 February 2026 (73.91 mm)

(December 2025 to July 2026)

Based on Automatic weather station (AWS) at ACCC.



ATREE's
Agasthyamalai
Community Conservation Centre (ACCC)
Manimutharu