

ARANYAM

Forest Wildlife Environmental Magazine

Sacred GROVE the Forest, Guardian

Śārngakkāvu:
A Living Museum of
Biodiversity

Landscape
Ecology:
Mapping the
Pulse of the Planet

The Sacred
Grove:
Where Earth's
Blessing Blooms

Feathered
Residents of
the Sacred Groves





മനുഷ്യ വന്യജീവി സംഘർഷ ലഘൂകരണത്തിന് വനം വകുപ്പിന്റെ അടിയന്തര പ്രതികരണ സംവിധാനം

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editorial

From vast forests to deep oceans, diverse ecosystems are what keep life on Earth going. Here in Kerala, we have a huge variety of them: seas, rivers, forests, mountains, laterite hills, backwaters, lakes, coastal forests and estuaries. All these habitats are home to thousands of different types of animals and plants. It is the amazing diversity and unique character that makes Kerala so visually stunning.

The Western Ghats are a mountain range that has massive influence on our society. But these mountains are not what they were a thousand years ago. Human interference has changed them dramatically. As an important component of our very existence, we need to protect the Western Ghats and its many habitats at any costs. A key part of this is understanding and applying landscape ecology.

Landscape Ecology plays a big role in preserving our rich resources, from genetic and species diversity to ecosystem, microbial, and agricultural biodiversity. This natural wealth is a big reason why our land is considered one of the world's mega-biodiversity hotspots.

In Kerala, our biggest challenge is protecting landscape ecosystems outside of the designated reserve forests and protected areas. To truly succeed in preserving Kerala's unique landscape, we need more than just the efforts of the Forest Department and other agencies, or even legal frameworks. It needs widespread awareness among the public about protecting the land we live on, along with proactive movements and strong support from the community.

Rajesh Raveendran IFS

Chief Editor

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Sacred groves sustain ecological balance by providing a natural habitat for numerous plants, animals, and microorganisms. They are also rich repositories of many medicinal plants.

SACRED GROVES

Research

Śārṅgakkāvu

A Living Museum of Biodiversity

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■ Dr. S. Gopakumar
■ Dr. Binoo P. Boni
■ Dr. T. K. Kunjamu

GROVES

In Kerala's cultural heritage and history, sacred groves known as Kaavu hold a unique and revered place. In Malayalam, the word Kaavu literally means a cluster of trees. Each grove carries its own cultural, biological, and ecological significance. Many such sacred groves in Kerala continue to be preserved in their natural purity even today.

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A.K. Saseendran

Minister for Forest and Wildlife

Our ancestors saw nature conservation as a part of life. They understood that sacred groves, ponds and tree-lined paths were essential for their survival. They even made it a practice to honor flowers, trees and forests through agricultural festivals. In this sense, a sacred grove is a special kind of habitat that embodies this noble worldview.

The very mention of sacred grove often fills us with a mix of awe, fear and respect. These groves, scattered across our countryside, are like mini-forests that perform all the functions as their larger counterparts (forests). They help maintain environmental balance, provide medicinal plants, protect streams, purify air and water and regulate climate. To ensure their preservation for generations, our ancestors thoughtfully placed Serpent idols (Naga Prathishta) and developed shrines. We must

Photo:
Prasoon Kiran



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Sacred Groves

Gifts of Nature

never forget that it is under the protection of this unwritten rule that these sacred groves still exist today.

Today, sacred groves are incredibly important as a refuge for rare trees and animals. They are home to a wide range of life, from unique trees like *Buccanancea lanceolata*, *Aegle marmelos*, *Strychnos nuxvomica*, *Spondias pinnata* and *Terminalia arjuna* to animals like civets, snakes, mongooses and foxes. The groves also host a vast variety of butterflies and a large bird population including hornbills and a number of amphibians. Sacred groves are also crucial in strengthening the bond between humans and nature. Their contribution to our cultural traditions like serpent worship, Pulluvan songs and Theyyam is particularly noteworthy.

In fact, some of the sacred groves in North Kerala are habitats for the rare White-bellied Sea Eagle. These birds, which typically nest in large coastal trees, find their primary refuge in these seaside groves. There is even a sacred grove in South Kerala that is home

to the very last remaining Kaavilipa tree, a rare species of the Iluppa family. The tree is protected as part of worship. Apart from these, our sacred groves are a treasure trove of rare trees and medicinal plants.



Taking into account the importance of groves in promoting life in harmony with nature and creating a healthy, sustainable environment, the department has been taking steps to protect these groves.

Recognizing this unique situation, the Forest Department has been giving special attention to protect these sacred groves. In line with the International Convention on Biological Diversity, a grove conservation project is being implemented here from 2013. At present, the department provides financial assistance annually to five selected groves in each district, with the amount based on their size and biological richness.

Taking into account the importance of groves in promoting life in harmony with nature and creating a healthy, sustainable environment, the department has been taking steps to protect these groves. We must not allow these green pockets of our heritage to be lost to modernization. Conserving these groves is an extension of a culture that lives in harmony with nature and it is essential for the survival of humanity itself. ■



A Journey into Kerala's Sacred Groves



E. Unnikrishnan

Researcher, Author

Photo:
Prasoon Kiran



A landscape is simply what you see from where you are. It is a mix of a region's physical feature and the life within it, which gives each one its uniqueness. Landscaper is a blend of everything that makes up a place such as soil, water, trees and people - all interacting to create something unique. Sacred Groves, known as 'Kavus' in Malayalam, are a perfect example of a nature-culture landscape (or ecocultural landscape) that is unique in both its ecology and its cultural significance.

These groves aren't just patches of trees; they're bustling miniature ecosystems. They are home for everything from the '*Terminalia nudiflora*' to the insect eating pitcher plant clinging to its branches. And it is not just about the plants. From the '*Dawkinsia denisonii*' in the pond to the *Malabar grey hornbill* nesting high in the trees, these groves provide a safe haven for countless creatures, making them a true substitute for a larger forest. Coastal and midland groves, though part of a broader green ecosystem, have their own distinct looks. While most coastal groves are evergreen and dominated by trees like Wild Jack, '*Hopia parviflora*', and '*Menecylom terminale*' with a dense cover of vines, some are unique, like the Thazhekkavu in Thekkumpad, which is special because it's filled with mangroves. Midland Groves, on the other hand, are famous for their incredible variety. They are nourished by a constant flow of water creating lush *Myristica* swamps and dense clusters of reeds. From the soaring canopies of the Naga tree and Peepal to the spreading '*Lagestroemia reginae*' and '*Schleichera oleosa*' trees, these groves are a mix of grassy fields, rocky slopes and lush canopies, making them a truly remarkable sight.

When people say sacred groves are the remnants of evergreen forests, it is important to remember that even within the same climate zone, factors like soil type can lead to completely different plant communities. A thriving forest can also degrade into a dry, deciduous one and a barren piece of land

can over centuries become a lush evergreen forest. This is why we see such a diverse range of forest structures and landscapes.

As tiny pockets of forest nestled among human settlements, sacred groves face a high risk of destruction. The edges of these groves are the most vulnerable and undergo the most changes. However, even then, the inner parts often retain an ancient memory of their plant life. Adding to this complexity, other sections of the very same grove might feature unique types of forests such as reed beds or marshy woods due to specific soil characteristics. This intricate nature makes it difficult to analyze Kerala's groves based on their individual features and structure alone. Instead, let's take a broader look at how these groves relate to the main forest divisions in Kerala.

Evergreen Groves

It is widely believed that large sacred groves like Theyyottukavu, Thavidisseri Kavu, Kammadathu Kavu, Poongottu Kavu, Iringol Kavu and Aravanchal Kavu are not recent creations. Instead, they are considered to be remnants of the once-thriving tropical evergreen forests of Western Ghats. Unlike groves that came into being more recently due to religious beliefs during the era of landlords and local rulers, these groves are believed to be primary, original forests. These groves are home to plants of tropical evergreen forest, including trees like '*Antiaris toxicaria*', '*Artocarpus hirsutus*', '*Elaeocarpus serratus*', '*Syzygium cumini*', '*Hopea parviflora*', '*Terminalia nudiflora*', '*Vateria indica*', and '*Holigarna arnottiana*'. You can also find an abundance of epiphytes like orchids growing here. Just like in a deep forest, the undergrowth here is thick with reeds and various kinds of '*Strobilathes spp*'. The groves also show features unique to evergreen forests, such as cauliflory and buttress roots.

The sacred groves of northern Kerala bear a striking resemblance to the evergreen forests that still exist in the Brahmagiri Hills of Karnataka. These dense, sacred forests can be classified as having the structure



As tiny pockets of forest nestled among human settlements, sacred groves face a high risk of destruction. The edges of these groves are the most vulnerable and undergo the most changes.



of a tropical evergreen forest. Even within these tiny forest fragments, a small part of it, most often the core, manages to retain its original evergreen micro environment and plant structure. However, deciduous trees and thorny bushes took over the disturbed parts of the grove, replacing the original evergreen plants. Trees and shrubs from the 'leguminosae' family, which are rare in evergreen forests, became common here. As such, the moist evergreen forest converted into a semi-evergreen one. In this transformed landscape, White Teak, Devil's Tree, Silk Cotton Tree and Rosewood dominated the upper canopy. Meanwhile, the lower canopy comprised of a mix of small evergreen trees and climbing plants like Bauhinia species and '*Dalbergia horrida*'. The ground is covered with prostrate plants like '*Naregamia alata*' and orchids such as '*Nervilia aragoana*'. This type of grove closely matches the "Western Ghats Tropical Semi-Evergreen Forest".

In Kerala, Tropical Semi-Evergreen Forests are found on hills up to 1,000 meters high. However, the midland sacred groves are located at a lower altitude, less than 300 meters. These groves can be seen as scattered examples of the rare lowland forests in Kerala, existing as a transitional zone between moist evergreen forests and semi-moist deciduous forests.

Among Kerala's twenty forest types, the most extensive and dense sacred groves are structurally most similar to the Western Ghats Tropical Semi-Evergreen Forests. A large, dense grove like Theyyottu Kavu was once a part of the mature Western Ghats Tropical Evergreen Forest. However, due to human pressure, these forests have regressed and now show characteristics of a tropical semi-evergreen forest. If this pressure on the living ecosystem continues, these groves could eventually degrade even further, becoming a "moist deciduous forest," dominated solely by trees that shed leaves.

Maruthu-Irumullu Groves

In northern Kerala, many forests that

once thrived on hardened laterite soil have degraded into a semi-evergreen state due to constant human interference. The dominant tree here is the '*Xylia xylocarpa*', along with other species like '*Lagestremia reginae*', '*Pterocarpus marsupium*', '*Lagerstremia microcarpa*' and '*Sechleicheria oleosa*'. The undergrowth often consists of '*Holarrhena antidysentrica*' and '*Wrightia tinctoria*'. Because of the unique soil, this type of forest is known by names like Laterite Semi-Evergreen Forest or Xylia Mixed Forest. Many of the midland groves that are exposed and vulnerable to external threats share characteristics with this type of forest.

Reed

Reed plant (chural) is seen much across Kerala's sacred groves, from the coastal ones like Thazhekavu, Idayilakadu Kavu, Cheruvathur, Poomalakavu and Parambathara Kavu to inland groves like Aravanchal Kavu and Chittoor Kavu. While the Western Ghat range is home to many different species of reeds, the most common variety found in these groves is the Calamus rotang. You can also occasionally spot pannichural in some of the inland groves.

Bamboo and Reed Groves

Bamboo and reed plants flourish in the green and deciduous forests across Kerala. Two common varieties, Bambusa

bambos and Dendrocalamus, can even be found in some inland groves. Dense clusters of reed (*Ochlandra*) have so far only been spotted in Kammadathukavu. A rare plant known as *Oxytenanthera ritcheyi*, which is native only to the Malabar region, grows along the borders of some groves in the Kasaragod district. In some inland groves, one can come across *Flagellaria indica* vines that spread across marshy areas. At a glance, they might be mistaken for reeds or bamboo, and their sprawling presence adds a distinct beauty to the grove's greenery.

Pine Groves

In the transitional zone between Kerala's inland and coastal regions, the soil is a distinctive red laterite. This unique soil

In northern Kerala, many forests that once thrived on hardened laterite soil have degraded into a semi-evergreen state due to constant human interference.





composition, combined with other factors like external influences on secondary succession or the climax community of a former primeval forest has led to the development of special groves dominated by specific types of trees. The key trees in these forests are from the Dipterocarpaceae family, including *Vateria indica*, *Hopea parviflora*, and *Hopea ponga*). All of these trees tend to grow together in communities. In groves like Karakkakavu and Mappidicherikavu in Kalikadavu, Bhagavathikavu in Karivellur, Kuniya and Udinoor Kulam, over half of the trees are white dammar. Bhagavathikavu in Chengalapadi and the Kulangattu Kavu in Cheruvathur are notable for being nayurip groves.

In parts of Theyyottukavu, as well as Sasthamkavu in Kasaragod's Edeniri and a few others in Korom village, Urip (*Hopea parviflora*) trees are the most dominant species. Interestingly, these groves are also home to other major trees like *Vateria indica*, *Hopea ponga*, *Hydnocarpus pentandra*, and *Cullenia exarillata*. All of these are local species of Western Ghats, which highlights their ecological importance. There's another fascinating thing about the Pine groves in Kannur-Kasaragod districts, as well as the ones in Kozhikode like Bhayankavu and Loknarkavu. In these northern groves, the main tree is *Vateria indica*. But as one moves south along the coast from Koyilandy to Malappuram, one cannot find *Vateria indica* trees at all. However, from Central Kerala towards south, *Vateria indica* makes a comeback and becomes a prominent tree in the coastal groves again. So what takes its place in Kozhikode and Malappuram? The main tree here is a close relative: the *Vatica chinensis*. On the flip side, *Vatica chinensis* is extremely rare in the groves of Kannur-Kasaragod districts.

Freshwater Swamp Groves

Small streams and rivers originate from sacred groves such as Kalashamala in Kunnamkulam, Kammadom and Theyyottukavu in Kasaragod, Chitturkavu (Belur), Aravanchalkavu, Mattannur Poongottukavu and Vallikkattukavu in Kozhikode, which all resemble a dense green forest. Along the banks of these streams, the plant life is completely different from the

Photos:
E. Unnikrishnan



rest of the grove. A unique feature of the trees here are their buttress roots, which acts against floods. The main trees along these stream banks are species native to the Western Ghat mountains such as pine species and *Syzygium travancoricum*, as well as the *Lophopetalum wightianum*. These can be seen as Myristica Swamps. Though pashupasi tree that produces Ponnampoo – a forest product—is considered the characteristic tree of Myristica swamps, the majority of the trees in Myristica groves from South Canara all the way to Thiruvananthapuram are *Gymnacranthera Canarica*.

Myristica swamps thrive where there's a constant supply of water, usually alongside a stream or river that keeps the groves lush year-round. Take the Taduppakavu in Karivellur, for example. Just half a century ago, this grove dedicated to the goddess Mookambika was a perfect example of a swamp grove. But now, the stream that fed it has dried up, and the grove has transformed into a semi-evergreen forest. The same kind of change is happening to Thurayilkottam in Kozhikode. Today, it's evolving into a Pine tree grove, but it was probably once a Myristica swamp.



While the midlands of Kerala were once full of forests, they are now mostly barren, laterite plains. In these areas, small, dense thickets known as "Laterite Scrubs" are seen in plenty.

to the wild thickets nearby. However, they do have some distinct plants, including shrubs like *Atalantia* and *Hugonia*, which are characteristic of these groves. Then there are the "single-tree groves" like Gulikan Kavu and Kalichan Kavu. These are small, sacred spaces centered around a single, revered tree like the *Plumeria*, *Memecylon umbellatum*, or *Syzygium caryophyllatum*. One can also come across a variety of shrubs like *Saccharum spontaneum* and *Acacia catechu*.

Grass lands

The midland laterite plains might look desolate, but they hold a secret. As soon as the monsoon arrives, these grasslands come alive with a stunning display of rare plants and animals. Fresh shoots of grasses like *Themeda* and *Rottboellia*, a blue carpet of flowers from the *Utricularia* and the intricate traps of the *Drosera*, which shimmer with dewdrops all give a life to these regions. Then, just as quickly as it appeared, it all vanishes with the dry season. The only plant that seems to defy the heat is *Polycarpa Auria*. Not just beautiful but these grasslands

Wild Thickets

While the midlands of Kerala were once full of forests, they are now mostly barren, laterite plains. In these areas, small, dense thickets known as "Laterite Scrubs" are seen in plenty. Pascal has described them as scattered patches dominated by plants like *Sisyphus spp.* A perfect example of vegetation, Pascal notes that these contain a mix of small trees like Sandalwood and shrubs such as *Sisyphus spp.* The groves also feature a wide array of climbing plants like *Calycopteris floribunda*, *Hemidesmus indicus* and *Abrus precatorius*. In these groves, several trees are not taller than five meters. While some, like *Lannea* might occasionally could be seen, most of these aren't well-preserved and are very similar



are a complete ecosystem. The Utricularia and Drosera plants here are carnivorous, and they find plenty of insects to eat. When rains come, shallow pools form in the rock depressions, bringing to life a collection of aquatic plants like Dopatrium, Blyxa, Valisneria and Nymphoides. This unique habitat is now under serious threat. Widespread laterite mining is destroying these areas, a problem that has got much worse with the introduction of modern stone cutting machinery.

This is precisely why the grasslands linked to sacred groves are so vital. Protected by tradition, they are a refuge for this fragile landscape. The unforested sections of many groves, including Madayikkavu, Parakkalayi, and Arittappara have these grasslands. The shallow rock pools known as Pallams are part of this unique terrain. The breathtaking combination of the green forest and the vast, open expanse of grass, flowers, and water is what makes these groves so stunning. It's a kind of beauty, found in places like Madayikkavu and Arittappara, that you won't find anywhere else.



Single Tree Grooves

In Kannur and Kasaragod districts, one can come across Single Tree Groves where a single tree, like the Ezhachempakam or Kanjiram, is worshipped as the home of deity like Gulikan or Kalichan. Some of the groves like Aiyiravilli temple is famous for single trees like Madhuca diplostemon that was rediscovered after being lost for a century. Another tree, Madhuca insignis, once believed to be extinct, still thrives in northern Kerala, where it's known as 'Njyanal', and can be found in Idayilakkad, Karivellur Mookambika, and Chamakkavu groves.

Until about thirty years ago, Madhuca insignis were a common sight in Payyanur region. They were left standing along the borders of properties for specific rituals on the sixteenth day of Karkidakam month (Malayalam Month) to ward off evils. The Poeciloneuron indicum tree is found only in Mookuthala Kavayal in Malappuram. One can also find Putranjiva trees in Malayathu Sarppakkavu in Thrissur, Pinaka tree in Keezhur Sasthamkavu in Kasaragod and a Baobab tree at Athinjhal Koorumbakkavu in Kanhangad. The Grewia umbellifera in the Idayilakkadu Kavayal has a relative -the Grewia palodensis- that grows in the groves of Irinchayam and Pallottu groves in



Thiruvananthapuram. Kerala's sacred groves are truly home to a remarkable collection of these rare and irreplaceable trees.

Unique Groves

Some of Kerala's sacred groves stand out as truly unique, with a structure unlike anything else. Their special beauty is a product of their landscape and the specific way plants grow together. For example, the Chamakkavu grove in Vellur, Kannur, is like a miniature forest, with a unique mix of *Syzygium ceylanicum* trees and *Memecylon grande*. You can see a similar kind of plant pattern in groves of Sankulangara in Thrissur and Idayilakkadu Kavu in Kasaragod. Another distinct example is Neeliyar Kottam in Kannur, which resembles the unique type of forests found on the laterite plains near the coasts of Karnataka and Maharashtra.

As we today divides Kerala into Highlands, Midlands, and Coastal regions, ancient Tamil literature had its own classification: Kurunji, Pala, Marutam, Mullai and Neytal. This Sangam-era system, which categorized land based on its dominant plants and purpose, was a way of understanding a landscape by its diverse characteristics. These were not isolated regions but interconnected productive

spaces—an "ecocultural landscape" where different types of land or Thinais blended together. A single sacred grove is never just one type of landscape. Instead, the inner and outer areas of each grove represent a variety of these different Thinais. A grove is not a uniform space but is a vibrant mosaic of green forest, thorny thickets, lone trees, banyan platforms, flowing streams, swamps, marshlands and grasslands. Kerala's sacred groves are, in essence, a colorful collection of all these different worlds. ■



A grove is not a uniform space but is a vibrant mosaic of green forest, thorny thickets, lone trees, banyan platforms, flowing streams, swamps, marshlands and grasslands.



Sacred Groves

Sanctuaries of Endemic Plants



V.C. Balakriashnan

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Photo:
Prasoon Kiran



It's 31 years ago that the first official book on Kerala's sacred groves was published. In 1995, 'Jeevarekha' in Thrissur released 'Vishuddha Vanangal of North Kerala' (Sacred Forests of North Kerala). It was this book, written by E. Unnikrishnan that first inspired me to learn more about groves. I am grateful for the opportunity I have had over the past few years to visit and document the biodiversity of more than a hundred of them in Kannur and Kasaragod districts.

Sacred groves are remnants of forests that have been protected for generations in the name of faith. The name "Kavu" itself suggests this purpose, as it translates in Malayalam to mean a sanctuary that "stands guard" over the land. In Kannur and Kasaragod districts, these groves are home to nearly a thousand plant species. This includes more than a hundred species that are endemic to Western Ghats. What makes many of these groves so special is their dominant species. In each one, you will find certain plants, whether they are towering trees or the undergrowth, that thrive and define the ecosystem, making the groves distinct and unique.

Some of Kerala's sacred groves contain a unique and ecologically vital ecosystem: the *Myristica* swamps. These wetlands are exclusive to Western Ghats region and can be found in areas like Kulathupuzha, Anchal, Shendurney, Arippa and Palode. Interestingly, these swamps also exist in some groves in North Kerala, a region not typically known for them. They can be found in places like Poongottukavu near Mattannur, Chirayilkavu and Varayilkavu in Kootali, Paliyeri and Mookambikakavu in Karivellur, Thechottu Kavu near Cheemeni, and Kammadamth Kavu in Kasaragod district. A key feature of these swamps is the presence of trees from the *Myristicaceae* family, which grow distinctive stilt roots that rise above the waterlogged soil.

These unique wetlands are home to a variety of trees, including *Myristica malabarica*, *Myristica fatua*, *Knema*

attenuata, *Gymnacranthera farquhariana* and *Myristica beddomei*. Among these, the *Knema attenuata*, *Myristica beddomei*, *Myristica malabarica* and *Myristica fatua* are all endemic to Western Ghats, making these groves a vital sanctuary for these irreplaceable species.

Many sacred groves are home to numerous plant species that are endemic, rare or even endangered. The *Garcinia talbotii*, an endemic tree of Western Ghats, was previously only reported from Malappuram district. Recently, it was discovered from Cherippadi Kavu in Kasaragod district. This same grove also contains *Brachypteris scandens* vine that is approximately 300 years old. Moreover, *Mammea suriga*, a tree once thought to be growing only in Kasaragod district, was recently found in some other groves in Uduma panchayat.

Not all sacred groves are the same. Some are defined by a single, dominant tree like the *Vateria indica*. This rare tree is part of the *Dipterocarpaceae* family. What's so special about the *Vateria indica* is that it is endemic to southern Western Ghats, meaning it's a true local treasure. You can see it in Thavidisherikkavu in Kasarogodu district and Karakkakkavu

grove in Kalikkadavu. It's also found in Mappittasherikkavu and smaller groves around Trikkaripur, as well as the Pookkunnathu Sreeshastha Bhagavathikavu in Uduma. These groves also serve as safe havens for other endemic trees from the same family, like the *Hopea parviflora* and *Hopea ponga*.

In northern Kerala's sacred groves, *Syzygium zeylanicum* is most abundant in the Chamakkavu in Vellur. This small tree also grows in the Idayilakkadu Kavu, which is notable for being one of the coastal groves located closest to the sea.

The *Syzygium chavaran*, an endangered tree endemic to southern Western Ghats, can be found in Kannur's Neeliyar Kottam grove. This grove is also home to over 500

Sacred groves are remnants of forests that have been protected for generations in the name of faith.



Memecylon grande trees, a species native to the Indo-Malaysian region. They also grow in Neeliyar Kottam groves. They are also seen in Edayilakkatu Grove. In Neeliyar Kottam, the undergrowth includes Gomphia serrata, which is the primary food source for the larvae of Monkey Puzzle butterfly.

Syzygium travancoricum is a critically endangered plant endemic to the southern Western Ghats, with most of its population found in Kolukkumalai. Another tree, Syzygium stocksii, looks very similar and was once thought to be the same species. It grows in areas near water and is also endangered. This tree is found in North Kerala (north of Palakkad Gap), and one can see century-old specimens in Paliyeri Mookambikakavu in Karivellur and Konginichal Kavu in Alappadamba.

Photos:
V.C. Balakrishnan



Photo:
Prasoon Kiran



Apart from the remarkable trees that are seen in Kerala's groves, these small forests are also home to a variety of endemic plants found across Western Ghats and Southern India. Many of these are vital parts of the grove's ecosystem, including *Bridelia stipulatis*, *Hydnocarpus pentandra*, *Calamus rotang*, *Hydnocarpus pendants*, *Naragamic alata*, *Artocarpus gomezianus*, *Syzygium carryophyllum*, *Flacourtia montana*, *Ixora brachiata*, *Ixora malabarica*, *Diospyros candolleana*, *Diospyros pruriens*, *Aspidopteris canarensis*, *Begonia crenata*, *Capparis rheedei*, *Cinnamomum malabratrum*, *Gymnostachyum febrifugum*, *Holigarna arnottiana*, *Osbeckia muralis*, *Salacia fruticosa*, *Salacia chinensis*, *Strobilanthes integrifolia*, *Andrographis atropurpurea*, *Dalbergia horrida* and *Aganope thyrsoflora*.

Flagellaria indica, a climbing plant mentioned in *Hortus Malabaricus*, is a rare find, documented only in the Paliyeri Mookambikakavu and the Shoolappukavu in Cheemeni. Another unique plant, Blonde Cucumber, which is the main food source for the Clipper butterfly, can be found in Chirayilkavu in Koodali.

These groves are also sanctuaries for many animals. In 2013, I came across the first confirmed sighting in South India of the Dwarf Skimmer (*Lyriothemis acigastra*) at Aravanchal Kavay.

Despite their immense ecological importance, many of these groves are at risk. Protecting these special habitats is essential for preserving the rich biodiversity they hold. ■





▲
Malabar trogon

Sacred Groves and Bird Life



C. Sushanth
Ornithologist, Author

Sacred groves, known in Malayalam as Kaavus, are echoes of a time when humans and nature lived in harmony. These miniature forests were once home to countless birds, from majestic hornbills to tiny sunbirds and flower pecker. In 1987, the Kozhikode chapter of the Kerala Natural History Society conducted a bird watching trip in Kozhikode. Our group visited a sacred grove in Chalaavoor, and we were amazed by what we saw. We spotted a variety of birds, including the leaf birds, hill myna, green pigeon, emerald dove and the mountain imperial penguin, along with the blue tailed parakeet, large goldenbacked woodpecker, velvet fronted nuthatch and pygmy woodpecker. What truly surprised us, however, was sighting



Sacred groves were once home to countless birds, from majestic hornbills to tiny sunbirds and painted sparrows.

a Malabar pied hornbill feeding in a large tree. The Malabar pied hornbill is the second largest hornbill, right after the great hornbill and spotting one so close to the city was an incredible experience.

My next encounter with Malabar pied hornbill was years later, in the riverside forests of Vazhachal-Athirappilly. Today, the Malabar pied hornbill is a rare sight in Kerala and it's a bird whose very existence is under threat. It's astonishing to know that this rare bird was a regular visitor to the groves just over three decades ago. However, the Indian grey hornbill is still a frequent visitor to the groves in Malappuram, Kannur and Kasaragod districts. Other birds one might spot in these sacred groves include the black-hooded oriole, Indian paradise



flycatcher and the Indian spotted owl. In southern Kerala groves, one can sometimes spot Malabar grey hornbill, a species unique to Western Ghats.

It's not just forest birds that seek refuge in the groves. Water birds like herons and cormorants also build their nests here. Years ago, a small Grove near the Kaimanam-Thiruvallam road in Thiruvananthapuram was home to a variety of water birds. Every monsoon, species like the night heron, pond heron and little cormorant flock here to nest. The nearby pond, marsh and Karamana River provided them with a perfect and plentiful food source. Sadly, a dispute over the land led to the Grove's destruction. The temple's deity was relocated and the trees and vines were cut down. And the birds' sanctuary was lost forever.

In Ulloor in Thiruvananthapuram, a small sacred grove once existed that most of the younger generation are not aware of. This

grove was a nesting ground for water birds like cormorants, night herons and pond herons. It was also a rare nesting spot for purple heron. Sadly, this grove was cleared for urban development and with the trees gone, so were the birds. Another grove that recently vanished was the one near Kulathupuzha temple. Before the pandemic, this grove was a lush sanctuary with large trees and dense vines. It was a haven for birds like Orange minivet and Malabar whistling thrush. Green pigeons and large ashy woodpigeon, a bird typically found in deep forests, were also seen there. Today, the trees of this grove have been cleared, leaving it silent and devoid of birds.

Sacred groves are a treasure trove of biodiversity and home to birds unique to Western Ghats, such as the Grey fronted bulbul, Blue-tailed parakeet, White bellied treepie, Malabar trogon and Malabar grey hornbill. One can also spot smaller birds like the Yellow browed bull, Littel spider hunter and Puff throated babbler.

The groves are a vital part of a healthy ecosystem. Beyond their rich birdlife, they teem with butterflies, dragonflies and other insects, as well as reptiles, amphibians, native fish and small mammals like jackals and mongoose. Sadly, these groves are disappearing at an alarming rate. It is a worrying trend that forests are being cut down and destroyed. We are losing these precious spaces and all the unseen ecological services they provide for our ecosystem. ■



Malabar barbet



Orange minivet



Spotted owl



White-bellied Blue Flycatcher

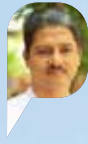
Photos: C. Sushanth

The Fungal Kingdom

A Hidden World of Biodiversity



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Sacred groves are an ancient conservation strategy developed by humans. They are dense areas of native plant life, protected by local communities through cultural and religious beliefs and taboos. These groves are living proof of a long tradition of nature conservation in our resource-rich country, with roots in pre-Vedic religious beliefs and cultural practices. They are crucial indicators of our biodiversity, representing the maximum number of plant species that existed before the rise of modern civilization. They are a true testament to our deep-rooted respect for nature.

For the last 30 years, research on the plant diversity of sacred groves in Western Ghats and Kerala has shown that these areas are rich reservoirs of plant and animal life, including many rare and endangered species. While there have been significant studies on the flora and fauna in these forests, the research on fungi has been very limited.



Groves are living proof of a long tradition of nature conservation in our resource-rich country, with roots in pre-Vedic religious beliefs and cultural practices.

Fungi are a unique group of living organisms that belong to one of the six kingdoms of life. They are the second largest group of organisms on Earth. This diverse group includes various forms like morels, molds, truffles, mushrooms, yeasts, rusts, smuts, and puffballs, along with many other lesser known species. Fungi play a crucial role in maintaining ecological balance and make up the majority of microorganisms in the soil.

Historically, most research on fungi in India and specifically in Kerala, has focused on habitats like deserts and saline lands. This has led to a major gap in our understanding of soil fungi in Kerala's native forests. To address this, we conducted a metagenomic analysis. We used Illumina MiSeq, an advanced next-

generation sequencing platform, to perform an internal ITS sequencing of similar soil samples. This approach is known for its high efficiency in classifying fungi and provides a more comprehensive dataset than previous studies.



The Study:

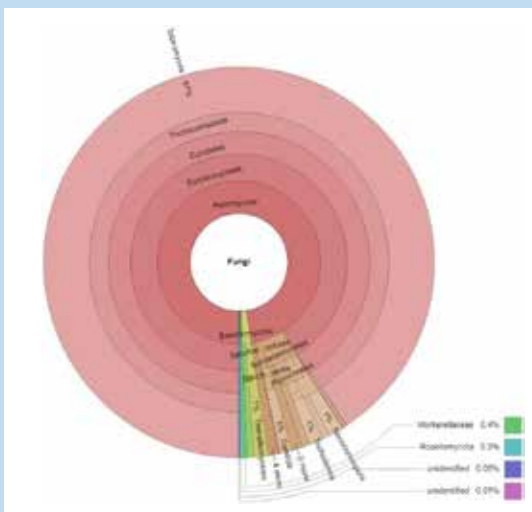
For this study, we selected three sacred groves from different regions of Kerala, based on their size, topography, diversity and unique ecosystems.

- Iringole Kavu, Ernakulam - Located in Central Kerala.
- Kollakkal Tapovanam, Alappuzha - Situated in Southern Kerala.
- Poyil Kavu, Kozhikode - Found in Northern Kerala.

Metagenomic Analysis Of Soil Fungi

A metagenomic analysis of soil fungi in the sacred groves revealed the presence of five fungal phyla. While these phyla were found across all groves, the abundance and structure of the fungal communities varied between them. The taxonomic classification of OTUs identified a total of 441 taxa. Of these, 205 were specifically classified as fungal genera, while the remaining 236 could not be identified.

The dominant phylum found was Ascomycota, followed by Mortierellomycota, Basidiomycota, Chytridiomycota and Rosellomycota. These phyla were further divided into 20 classes, 40 orders, 83 families, 119 genera and 135 species. Eurotiomycetes was the most prevalent class within this group.



► Photos:
Keerthana Nandakumar



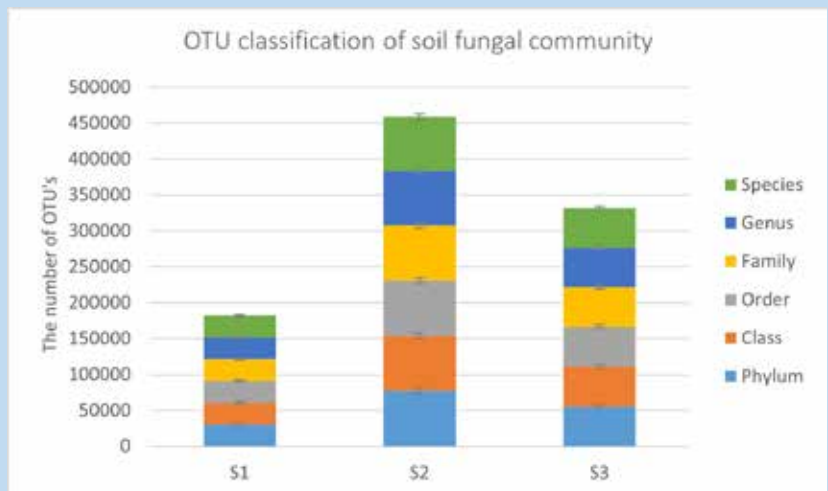


In our analysis, genus *Talaromyces* from the family Trichocomaceae was the most prevalent fungus found in all three soil samples. The high presence of *Talaromyces* suggests a positive impact on the plant diversity within the sacred groves, as these fungi are known to be effective against plant pathogens, acting as biocontrol agents and fungicides. Other fungi that were found in abundance included *Neocallimastix falsiformis*, *Trichoderma reesei* and *Candida ethanolica*. The study also revealed unique fungal genera in each location: Kollakkal Tapovanam had 32 unique genera, Poyil Kavu had 18 and Iringole Kavu had 14. This indicates that while sacred groves share some common species, certain fungi are specific to individual groves, highlighting the importance of each one as a distinct and unique ecosystem.

Poyilkavu

Our analysis showed that Kollakkal Tapovanam had the highest biodiversity and dominance among the three sites, while Kollakkal Tapovanam and Iringole Kavu were the most similar to each other.

In short, the study reveals that Kerala's three sacred groves are rich reservoirs of soil fungi, each with its own unique biodiversity. Many fungal species were found only in specific groves and not in others, highlighting a high degree of specialization among the fungi. This underscores the need to preserve these microorganisms in their natural habitats, as even small changes to the ecosystem could lead to the extinction of certain species. This research is one of the first to use a metagenomic approach to analyze and compare fungal diversity in the soil of sacred groves. ■



Śārngakkāvu

A Living Museum of Biodiversity

Both climate change and loss of biodiversity are two of the biggest environmental challenges facing our planet. Studies have shown that the extinction rate of species due to human activity is a thousand times higher than that caused by natural factors. This also holds true for Kerala's sacred groves.

The plant diversity found in these groves is remarkably similar to that of tropical rainforests. This makes them a great solution for preserving biodiversity and fighting climate change. As they are so deeply tied to society and local culture, people's beliefs and scientific views have a huge impact on the groves' continuous and crucial survival.

Protecting the Groves: Social Attitude

In a world of fast paced development and rising population, the hunger for land is growing and it is taking a toll on our small, unprotected green havens. As such, these sacred groves, once cherished for their ancient beliefs, are now vanishing with the shift in society's values. As our need for natural resources soars, these lush groves are being replaced by plantations that promise higher profits. It's a sobering reality: studies reveal that plant diversity in nearly 80 per cent of these groves has plummeted. The biggest culprits, as studies across India have shown, are our own changing attitudes and direct human interference.

The way people view and interact with sacred groves is having a serious effect on them. Changes in land use pattern and the resulting damage to the ecosystems pose a severe threat to these natural resources. Our attitudes and actions, in many ways, are the biggest challenge to their survival.



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It was against this backdrop that led to this particular study. For the research, we chose a small piece of this natural history: a sacred grove known as 'Sharngakavu' in Venmani, located in Chengannur taluk, Alappuzha. The aim was to get a deeper understanding of the community's views on the grove's preservation, gauge their awareness of climate change and see what they believe about the role these groves play in our collective battle against a warming world.

The Study

This sacred grove, over 500 years old, is nestled close to human settlement. Its southern border is graced by the Achenkovil river, adding to the serene beauty of the location. This 1.3-hectare sanctuary, teeming with lush plant life, is a revered spot where devotees regularly come to perform rituals with great devotion.

For our study, we categorized local residents as "Native Residents" (NR), regardless of their religion. Devotees who visit the grove but do not live in the area were considered "Non-Resident Devotees" (NRD). We collected data from both groups through one-on-one interviews using a detailed questionnaire. To get an even deeper understanding of the grove and its significance, we also held a focus group discussion with members of the Sharngakavu Conservation Committee. This session provided us with invaluable insights, going beyond what we could learn from the individual interviews.

To evaluate public awareness about climate change and their views on conserving the sacred grove, we used a Weighted Average Index and a Garrett Ranking. We also conducted a Mann-Whitney test to see if there were any differences in opinion between local residents and visiting devotees.

While construction is prohibited within the grove, the lack of a clear boundary

has led to some minor human disturbances. For this reason, we divided the grove into a 'Core Zone' with minimal human impact and a 'Buffer Zone' where human activity is more likely. We then identified the plant species in both areas and compared the two. We also measured the amount of carbon stored in the grove's plants and soil.

Legend of Sharngakavu

Over 500 years ago, the main idol of Vanadurga (goddess of the forest) is believed to have emerged on its own. Legend has it that a golden temple for the goddess exists at the bottom of the nearby Achenkovil river and as such no special temple or other structure has been built for this idol.

Beliefs also prohibit building temples or other structures around the grove. When the water level in Achenkovil river rises during the monsoon, it is considered the ritual bathing of the goddess. Another special feature of this grove is its resident monkeys.



In a world of fast paced development and rising population, the hunger for land is growing and it is taking a toll on our small, unprotected green havens.



These monkeys are seen as the goddess's companions and are a major attraction at Sharangakavu.

According to oral tradition passed down through generations, this village was once a forest where King Sharanga usually hunted animals. Sage Agastya once cursed the king for killing innocent animals. To be freed from the curse, the king performed penance in the very spot where the grove now stands. The peace he found there revitalized him and he asked the people to preserve the grove exactly as it was. That is how the grove got its name Sharangakavu. Today, a group of Brahmin families are in charge of protecting the grove.

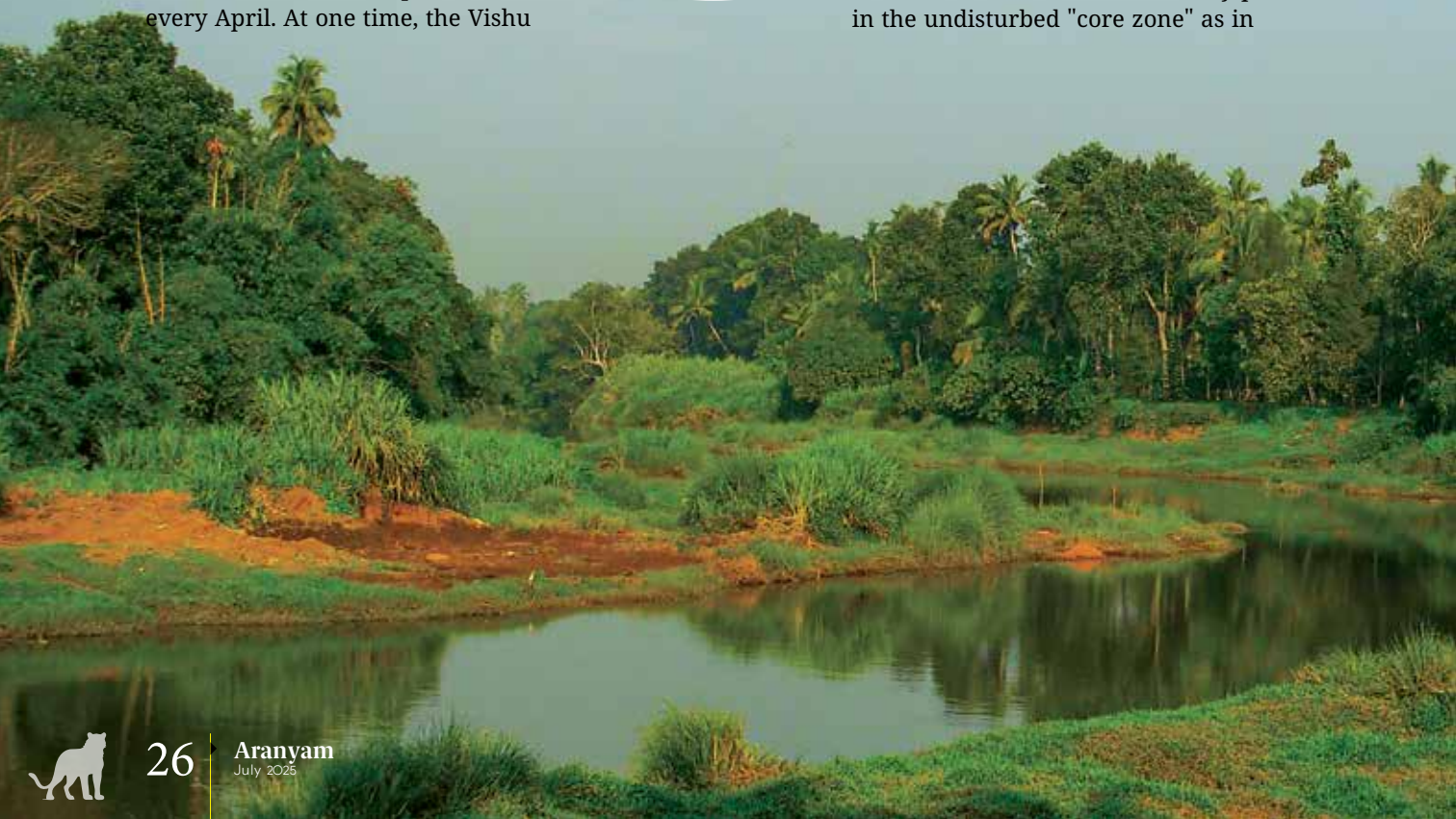
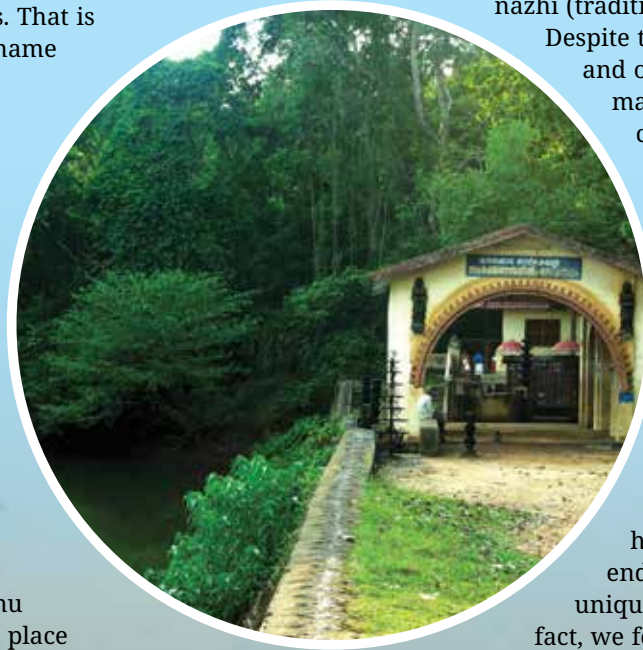
Although there's no official legal protection, the deep faith of local community has turned the grove into a sacred living space. What truly makes the grove famous are the annual Vishu festival, Kettukazhcha and Vishu market, which all take place every April. At one time, the Vishu

festival at the Sharangakavu temple was the main marketplace for agricultural products from the Central Travancore region (also known as Onattukara). This tradition serves as a reminder of our rich agricultural heritage. Even though agricultural prosperity has faced setbacks over time, one can still buy yams, colocasia and tapioca, along with various other farm products and handcrafted household items like baskets, spoons, and winnowing fans. You can still find farm tools like plows, axes and changazhi and nazhi (traditional measuring vessels).

Despite the rise of supermarkets and online shopping, Vishu market at Sharangakavu continues to thrive with all its traditional splendor, a testament to the community's dedication to its customs.

Sharangakavu: A Haven of Biodiversity

This sacred grove is a treasure trove of plant life. We were able to document 67 species here, including some endangered ones and others unique to Western Ghats. In fact, we found twice as many plants in the undisturbed "core zone" as in



the "buffer zone," where there's been some human activity. The most common plant we found was the 'Caryota urens.' We also came across other important trees like *Antiaris toxicaria*, *Hopea ponga* and *Vateria indica*. However, the presence of invasive species like the *Chromolaena odorata*, *Macanga Peltata*, *Acacia caesia* and *Epipremnum Aureum* indicates that human activity and some small disturbances are affecting the grove's ecosystem. The spread of *Acacia caesia*, in particular, has been stunting the growth of young trees. Though the local people have been removing these invasive species, they have not completely succeeded.

The beliefs tied to this grove have created an invisible fence, protecting it. A major issue many other sacred groves face is that they prioritize the place of worship over the grove itself to accommodate more devotees. Often, parts of the grove are cleared for parking or restrooms, leaving only the idol and its structure intact. However, Sharangakavu's unwritten rule against any construction has shielded it from these problems. In an age where development often takes precedence over tradition, it's vital to raise awareness about the purpose of these groves. We need to educate people about their role as a genetic storehouse and their ability to help combat issues like climate change. ■



The Story of Sacred Groves

Sacred groves, known as "Kavu" in Kerala, are a part of our heritage. These are not just forests; they are untouched patches of woodland protected by deep-rooted beliefs. People have long believed that these groves are home to local deities, ancestral spirits and other unseen, mystical forces.

The origin of these sacred spaces dates back to the Stone Age, when agriculture first began. As farming spread, people needed more land. This often meant clearing forests to create fields. However, according to ecologist Madhav Gadgil, our ancestors came up with a solution to avoid using up all the forest land for farming and to protect their natural resources. The sacred groves were their answer. These groves are a powerful example of an ancient, community-led model for preserving and sharing natural resources. They show us how our ancestors lived in harmony with the environment, long before the modern concepts of conservation came to be.

India holds the record for the highest number of sacred groves in the world.

Kerala stands out with

361 significant groves.



Sacred Groves

Green Patches of Nature

Kerala's cultural heritage and history are deeply intertwined with its sacred groves, known as kavu. In Malayalam language, the word "kavu" simply means a cluster of trees. These groves are much more than just a collection of plants; each one holds a unique cultural, biological and ecological significance. Across Kerala, countless kavus have been preserved in their pristine state for generations.

This incredible feat of conservation is largely thanks to the strong belief systems that protect them. These groves are revered as virgin forests and that deep-rooted faith has been the driving force behind their survival.

Nature's Treasure

Each sacred grove is a unique world in itself. They stand as powerful symbols of the unshakeable beliefs and traditions that have long shaped the communities who protect them.

Today, these groves are more important than ever. They serve as a crucial refuge for rare trees and animals, acting as natural sanctuaries. By providing a home for countless plant species, wildlife and microorganisms, these groves play a vital role in maintaining ecological balance. Many of them are also a rich source of medicinal plants, making them invaluable storehouses of natural healing.

Protection

Sacred groves are vital for preserving a wide variety of plants, including many that are endangered or native only to this region. The Kerala Forest and Wildlife Department recognizes the importance of these sacred

groves and is actively working to protect them.

Through its Social Forestry wing, the department has a special scheme to protect and maintain these groves. Every year, five groves in each district are selected and financial support is given to them. Since 2021, over

265 people have received this assistance to help conserve their local groves.

It's crucial that we all understand the critical role these groves play in a healthy, sustainable environment and in shaping a life in harmony with nature. We must not destroy these green patches, which are part of our heritage, in the name of modernization. The conservation of sacred groves isn't just a choice; it's an essential part of our responsibility to all of humanity. ■



Every year, five groves in each district are selected and financial support is given.



Sacred Groves

Sl.	Districts	Number	Area (ha)
1	Thiruvananthapuram	452	45.60
2	Kollam	895	97.50
3	Alappuzha	2242	182.93
4	Pathanamthitta	721	58.47
5	Kottayam	562	35.20
6	Idukki	32	3.00
7	Ernakulam	708	61.87
8	Thrissur	970	32.54
9	Palakkad	184	22.03
10	Malappuram	1120	88.50
11	Kozhikode	1231	143.97
12	Wayanad	137	25.00
13	Kannur	1096	263.82
14	Kasargod	392	148.31
TOTAL		10742	1208.74

Source: Institution of Foresters, Kerala

Photos:
Prasoon Kiran



Landscape Ecology



Dr. Shaju Thomas
Professor in Zoology (Rtd.)

With the rise of new technologies and the possibilities they offer for studying nature, a new field called landscape ecology was born. This discipline aims to study nature in a way that is visible to our inner eye as well as from a bird's-eye view, all in the effort to find new ways for sustainable development.

German scientist Humboldt (1769-1859) used the word "landscape" for the first time to describe a person's understanding or appreciation of a particular area of land. However, it was German biologist Carl Troll (1899-1975) who brought the term "landscape ecology" into common use. He defined it as the study of how the spatial and visual aspects of human surroundings are connected to the lithosphere, biosphere and human-made physical objects.

In simple terms, a landscape is a complex area that we can see, shaped by a combination of natural elements (living and non-living), people and human activities. Unlike traditional ecology, which often focuses on a single ecosystem,



a landscape is a complex area that we can see, shaped by a combination of natural elements (living and non-living), people and human activities.



landscape ecology studies how these diverse components interact across a broader landscape. The theoretical foundation for this field was laid by two American academics: Robert H. MacArthur, a professor at Princeton University and Edward O. Wilson, a Harvard biologist. In their 1967 book, "The Theory of Island Biogeography," they explained how species migrate from continents to islands and how this leads to the extinction of native island species. This work sparked a new conversation about the challenges that organisms face due to habitat fragmentation on continents. Apart, this book also paved the way for new approaches to ecological study. The field of landscape ecology was formally established as a sub-discipline of environmental science with the publication of two key books: "Landscape

Moreover, these different parts are all interconnected. This also includes the changes that happen over time and space due to human activity. As such, landscape ecology focuses primarily on a region's diversity, its spatial layout and the changes to its structure and processes resulting from human interaction. This field takes a serious look at the impact that humans and human societies have on their environment. More than being a single, integrated discipline, landscape ecology is now seen as a multidisciplinary subject.

It's widely accepted that ecosystems maintain their existence through a state of ecological equilibrium. However, it wasn't until 1980s that the understanding of Dynamics of Ecosystem became clearer. It



▲ Photos: Prabhu Mens Sana

Ecology: Theory and Application" by Zev Naveh and Arthur S. Lieberman in 1984, and "Landscape Ecology" by Richard T. T. Forman and Michel Godron in 1986.

From the perspective of Forman and Godron, a landscape is a complex, varied area made up of a repeating pattern of interacting ecosystems. A great example is a typical village in Kerala, with its rivers, ponds, rice fields, coconut groves and human settlements. Here, one can find different patches of land, varying in size and scattered in a seemingly random way, but they all make up different ecosystems within the same landscape.

was proven that nature is in a constant flow of energy and matter and that ecosystems are not "closed" systems. Rather, they are continuously evolving and interacting with each other. The fourth key factor in this evolution was the leap forward in technology and data analysis. Tools like satellites, remote sensing and Geographic Information Systems (GIS) along with computer-assisted data analysis, have given a huge boost to landscape ecology. Aerial views have provided new insights into the Earth's physical and biological structure. Furthermore, the landscape ecology approach has gained both national and legal



recognition. Institutions like the World Bank and the Asian Development Bank now rely on landscape ecology for their development projects and environmental conservation efforts.

Landscape ecology isn't just about studying the structure, evolution and changes of a specific patch of land. It also delves into how a place changes over time and space and the complex ways its different parts interact with each other. This gives us a blueprint for creating plans for development and conservation. Now, we are a step further. We are using the principles of landscape ecology, but with an added twist by bringing in artificial intelligence (AI) and machine learning. This helps in analysing vast amounts of data about the Earth's surface by weaving together information across both space and time. It helps us evaluate the benefits and drawbacks of development projects and take precautions. This approach helps in plan development in a way that respects the natural landscape and values the ecological services it provides, rather than just bulldozing it all.



New technologies are bringing more precise approaches to landscape ecology.

Of the many terms associated with this field, one of the most prominent is Landscape elements (LSEs), which can be either natural or human-made. Other key terms include Landscape patches, corridors and the Landscape matrix that connects them all. It's important to remember that studying landscapes with a variety of structures, compositions, functions and heterogeneities is not as simple as studying a single ecosystem. However, new technologies are bringing more precise approaches to landscape ecology. This field can help us solve socio-ecological problems by focusing on a landscape's Pattern, the Process happening within it, the Services it provides, and its Sustainability. There's no doubt that this approach will be incredibly useful

for developing strategies to combat the effects of climate change. In order to create eco-friendly and sustainable development plans that respect its unique landscape in Kerala, our planners and leaders must consider the full potential of landscape ecology. ■



Dipterocarpaceae

A Tree Family on the Brink



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The Dipterocarpaceae family is an important group of plants, both ecologically and economically, in many countries across Southeast Asia. This family is incredibly rich in biodiversity. It was named by German-Dutch botanist Karl Ludwig von Blume, who first identified the genus as *Dipterocarpus*. The name itself comes from the Greek words for "two" and "wing," a reference to the distinctive two-winged fruits that these trees produce.

In India, the Dipterocarpaceae family is found primarily in Western Ghats, Northeastern states, and the Andaman and Nicobar Islands. This family consists of 32 tree species across six genera: *Anthoshorea*, *Dipterocarpus*, *Hopea*, *Shorea*, *Vateria*, and *Vatica*. These trees, which can grow 20 to 50 meters tall, are typically found in both evergreen and semi-evergreen forests. Interestingly, some species in this family only flower and bear fruit every two to five years. Out of the 18 species of Dipterocarpaceae found in the Western Ghats, ten are endemic to the region, and 12 are listed in the IUCN Red List of Threatened



In India, the Dipterocarpaceae family is found primarily in Western Ghats, Northeastern states, and the Andaman and Nicobar Islands.

Species. Of these 18 species, 13 are found in Kerala, ten in Karnataka and nine in Tamil Nadu.

Dipterocarpus

Of the species in this genus, the two most common are *Dipterocarpus bourdillonii* and *Dipterocarpus indicus*. These trees typically flower and bear fruit between December and May.

Dipterocarpus bourdillonii is most abundant in Kerala (in areas like Pampa, Aralam, and Urulanthanni), with smaller numbers found in Tamil Nadu and Karnataka. In 2020, the IUCN reclassified this species as "Critically Endangered" on its Red List. *Dipterocarpus indicus* is found in regions from Agumbe and Makutta in Karnataka to Tirunelveli in Tamil Nadu. A significant population of these trees is also found in the Vellani-Pacha area of Thrissur district in Kerala. The IUCN has reclassified *D. indicus* as "Endangered" on its Red List.



Fruit of *Vatica chinensis*



Hopea parviflora



▲ *Anthoshorea roxburghii*

Hopea

The genus *Hopea* includes trees that can grow up to 30 meters tall, found in evergreen and semi-evergreen forests. There are about 114 species worldwide and 13 of them are in India. Ten of the Indian species are endemic to the Western Ghats. They are *H. canarensis*, *H. erasa*, *H. glabra*, *H. jacobii*, *H. ponga*, *H. ponga* var. *cauveriana*, *H. racophloea*, *H. parviflora*, *H. sasidharanii*, *H. longifolia*. Species like *H. parviflora* and *H. ponga* are found in Kerala, Tamil Nadu and Karnataka. In the past, these trees were heavily cut down for local use and for making railway sleepers. One species, *Hopea jacobii*, was discovered in the Coorg forest region of Karnataka in 1925 but has not been found since. As a result, it is believed that this species may be extinct.

Some species like *H. erosa*, *H. glabra* and *H. racophloea* are seen very rarely. These are

found mostly in the forest areas of Kerala. In 2020, a new species was discovered in the Shendurney Wildlife Sanctuary. It was named *H. sasidharanii* in honor of Dr. N. Sasidharan, a prominent botanist. Another rare species, *H. longifolia*, is found in the Tirunelveli region of Tamil Nadu and the Shendurney forest region of Kerala. Of the ten species endemic to the Western Ghats, two have been reclassified as "Critically Endangered," four as "Endangered" and one as "Vulnerable" on the IUCN Red List (as of 2022).

Anthoshorea & Shorea

Anthoshorea and *Shorea* genera consist of trees that grow in deciduous forests at altitudes between 400 and 1,000 meters. Four species are found in India and two of them are in the Western Ghats: *Anthoshorea roxburghii* and *Shorea tumbugiyaia*. *Anthoshorea roxburghii* was once classified under the *Shorea* genus. It can be found in the Muthanga and Parambikulam regions in Kerala and Mudumalai in Tamil Nadu's National Park. The IUCN has listed this species as "Vulnerable" on its Red List. *Shorea tumbugiyaia* is found in Andhra Pradesh and more rarely in Tamil Nadu. This species is classified as "Endangered" in the IUCN Red List and requires more conservation efforts. Trees in these genera typically flower between January and March, with fruits appearing from May to June.

Vateria

Of the three species of the genus *Vateria* found in Sri Lanka and Southern India, only two are found in the Western Ghats. *Vateria indica*, also known as the white dammar, is



most common in the evergreen and semi-evergreen forests of Kerala, Karnataka and Tamil Nadu. The other species, *Vateria macrocarpa* is found only in a few specific locations such as Muthikulam, Siruvani and Varadimala in Kerala and Bolampatti Reserve Forest in Tamil Nadu. Both species are under threat. They are often damaged by humans who light fires at the base of the trees or cut their trunks to collect frankincense, which can ultimately destroy the trees. The IUCN has classified *Vateria macrocarpa* as "Critically Endangered" and *Vateria indica* as "Vulnerable" in its Red List.

Vatica

Two species of the genus *Vatica* found in India are *Vatica chinensis* and *Vatica lancifolia*. *Vatica lancifolia* is found in the northeastern states of India. *Vatica chinensis* is found in the sacred groves and nearby habitats of Malappuram and Kozhikode districts in Kerala. A few trees are also found in the Udupi region of Karnataka. The IUCN has reclassified this species as "Endangered" on its Red List. A group of these trees near the Parappanangadi railway station in Malappuram was recently cut down to make way for railway development.

Morphology and Field Identification

While it's not difficult to tell Dipterocarps apart from other tree families, identifying individual species within a genus requires an experienced eye. These trees, which can grow from 20 to 50 meters tall, are typically identified by their bark, leaf arrangement and fruits, since their flowers and fruits aren't always available for observation. For example, *Hopea racophloea* is easy to identify because its bark peels off the trunk in large chunks. Another

method for identification is to examine the color and texture of the resin that seeps out when the tree's trunk is cut. In addition to traditional methods, modern science is also helping with identification. The Kerala Forest Research Institute has created a DNA barcode for each species, using the unique nucleotide sequence patterns of their DNA fragments. This data has been uploaded to online libraries like the NCBI.

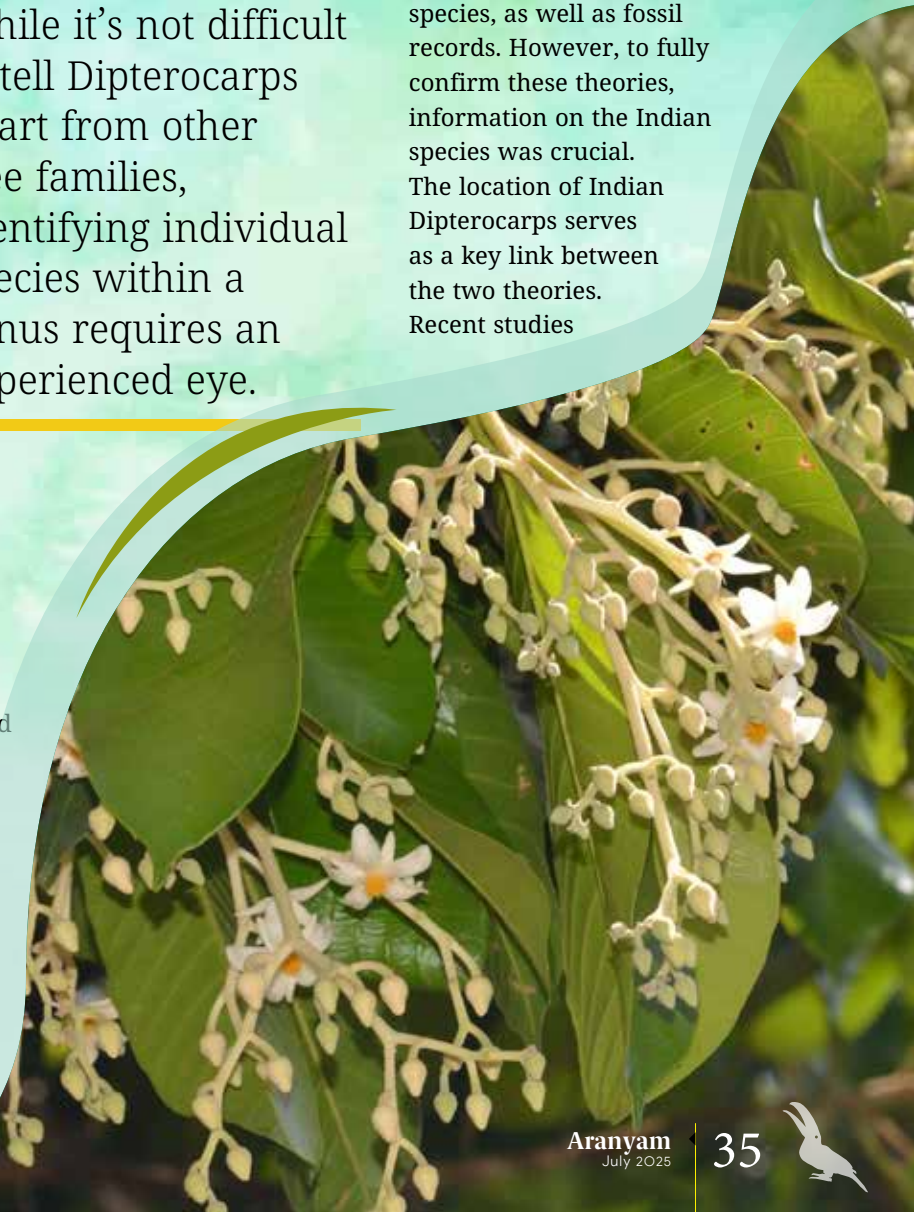
Origins and Biogeography

There are two main theories about the origin and current distribution of Dipterocarps. One theory suggests they originated on the Eurasian Plate, while the other proposes they came from Gondwana.

These theories are based on the distribution patterns and DNA analysis of each species, as well as fossil records. However, to fully confirm these theories, information on the Indian species was crucial. The location of Indian Dipterocarps serves as a key link between the two theories. Recent studies



While it's not difficult to tell Dipterocarps apart from other tree families, identifying individual species within a genus requires an experienced eye.



suggest that this plant family is much older than previously thought, originating around 72.66 million years ago. They are believed to have originated in the regions that were once part of Gondwana: India-Sri Lanka and Madagascar. This finding strongly supports the Gondwana theory.

Studies show that the dispersal route for Dipterocarps followed a path from Madagascar to India, and then from India to Asia. The origin of the Hopea and Shorea genera, however, is believed to be in Southeast Asia. This suggests that the Dipterocarps also spread back to India from Asia during the mid-Miocene period.

Importance of Conservation

Dipterocarps have been highly significant in Southern India since prehistoric times. A testament to this is the mention of Sal tree (*Shorea robusta*) in stories about the birth and Parinirvana (final release from the cycle of rebirth) of Buddha. According to legend, a bed was prepared for Buddha to rest between two Sal trees in a Sal grove on the banks of Hiranyavati River. Kautilya's Arthashastra also lists the Sal tree as one of the strongest trees in the forest.

It is crucial to protect these tree species endemic to Western Ghats that belong to this family. These 12 species, which are on the IUCN Red List, are now confined to only a few areas. Their survival is being threatened by a number of factors, including changes to their habitat, climate change and human interference.

Any conservation program must be focused on evaluating the problems and creating the right environment for these species to thrive.

Among various methods, Maxent modeling is particularly effective at predicting potential habitats for these trees. It uses existing distribution data and bioclimatic information to identify key variables that influence a species' spread, which helps predict where new, suitable areas might exist. The Kerala Forest Research Institute is using these methods to help conserve these endemic tree species within their own plant conservation collections. ■



Dipterocarps have been highly significant in Southern India since prehistoric times.



Hopea erosa



Hopea ponga



Shorea roxburghii flower



Vatica chinensis flower

Fruit of Vatica chinensis



Nelliampathy Torrent Frog



World of Amphibians



Dr. Sandeep Das

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Amphibians are a group of animals that most people instinctively dislike or even find disgusting. Their slimy skin, appearance, lifestyle and even how they act when you get close can often be a turn-off. But should we really dismiss them so easily? Absolutely not! Amphibians are actually a very important part of nature. Think of them as nature's own pest control. They play a huge role in keeping the populations of countless insects in check. Many of these insect species multiply at an alarming rate and are responsible for a lot of diseases and crop damage. Without amphibians, we would be in great trouble. Amphibians and tadpoles, which can breathe through their skin as well as their lungs, are considered excellent bio-indicators of clean water sources. Unfortunately, amphibians are also one of the animal groups most at risk of extinction due to human interference. According to the IUCN, a staggering 41 per cent of all amphibian species are on the threatened species list. This makes them one of the most



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endangered groups of animals on the planet.

In general, amphibians are animals that live both on land and in water. More specifically, they are vertebrates distinguished by a few key characteristics: they lack a shelled egg and an embryonic membrane, they can breathe through their skin and they don't have scales. For a large portion of their lives, they depend on water.

Fossil evidence suggests that amphibians evolved during the Devonian Period, approximately 400 million years ago. They are believed to have descended from lobe-finned fish that moved from the sea into freshwater sources. Over time, their fins evolved into limbs, giving rise to the first lizard-like amphibians. Even though they moved onto land, their lack of shelled eggs and their status as cold-blooded animals meant that many species had to maintain a dual lifestyle, spending part of





Chalazodes Bush Frog ▲



Galaxy Frog ▲



Mahabali Frog ▲



Small Tree Frog ▲



Southern Swamp Frog ▲



Star-eyed Ghat Frog ▲

▲ Photos:
Dr. Sandeep Das

their lives, especially during reproduction, in water. This dual existence is what gave them their name: "amphibian", which comes from two Greek words, amphi ("both") and bios ("life"), literally meaning "both lives."

Scientists have discovered 8,781 species of amphibians. They have been categorized into three main orders:

Anura: This order includes the most familiar amphibians, like frogs and toads.

Caudata: This group consists of salamanders, which resemble lizards.

Gymnophiona: These are the limbless caecilians, which look like a cross between earthworms and snakes.

As other vertebrates evolved, amphibians began to face stiff competition for space, food and air. This led them to get smaller and adapt to microhabitats and microclimates, which helped them disperse across a wide variety of environments. Although they are less common in extremely cold regions, amphibians are now found in diverse habitats, from deserts to tropical forests. Like other animal groups, the highest diversity of amphibians is found in the tropics. On the global amphibian map, Brazil holds the top spot with 1,175 species, while India ranks sixth with over 450 species. Half of India's amphibian species are found in the Western Ghats, including Kerala. Of the over 250 species recorded in the Western Ghats, 190 are found in Kerala alone. More than 90 per cent of these species are endemic.

Amphibians in Kerala

In May 2011, the Kerala Forest and Wildlife Department, with the support of Dr. Jafar Palot of the Zoological Survey of India, conducted the first comprehensive survey of reptiles in the Wayanad Wildlife Sanctuary. This pioneering effort brought together herpetologists and forest officials. Following that success, a new survey in 2016 on both amphibians and reptiles was launched in Thattekad Bird Sanctuary. Led by M.P. Sanjayan, Dr. K.P. Rajkumar and the author, the survey involved around 30 volunteers



and an equal number of forest officials. Approximately 25 amphibian species and 34 reptile species were documented here. Since then, numerous surveys on amphibians and reptiles have been carried out in protected areas across Kerala. We can say that such a focused study, sponsored by a state forest department, is rare in India. This commitment to conservation has led to a unique development. For the first time in India, an amphibian has been designated as a protected area's flagship species. The Himalayan Salamander (*Tylototriton verrucosus*) is the flagship species of the Jore Pokhri Wildlife Sanctuary in Darjeeling. In Kerala, Galaxy Frog (*Melanobatrachus indicus*) is the flagship species of Mathikettan Shola National Park and Purple Frog (*Nasikabatrachus sahyadrensis*), also known as Mahabali Frog, holds this title for the Peechi Wildlife Sanctuary. This recognition is a direct result of the surveys and studies conducted in the region, highlighting Kerala's leadership in amphibian conservation.

Of the approximately 190 amphibian species found in Kerala, more than 170 are endemic to the Western Ghats. Among these, three frog families are especially notable:

- **Micrixalidae:** they communicate by waving their feet during breeding season.
- **Nasikabatrachidae:** This family includes the Purple Frog or Mahabali Frog, which is considered a living fossil. It spends almost its entire life underground, emerging for a single day each year to breed. It is related to the ancient Seychelles frogs.
- **Ranixalidae:** The tadpoles of this family develop their hind legs much faster than other frogs, a key adaptation that helps them thrive on rocks.

All these three frog families are endemic to the Western Ghats. Apart from this, *Astrobatrachus*, *Beddomixalus*, *Blaira*, *Ghatixalus*, *Gegeneophis*, *Indirana*, *Indotyphlu*, *Melanobatrachus*, *Mercurana*, *Micrixalus*, *Mysticellus*, *Nyctibatrachus*, *Petropedetes*, *Urotiphus*, *Vakerana* are also

endemic to the western ghats. In terms of global extinction risk on the IUCN Red List, the *Micrixalidae* family and the *Micrixalus* genus rank fifth worldwide and first in the Indo-Malayan biodiversity region. Out of the 24 species in this genus, 17 are found in Kerala. ■

Looking at the diversity of protected areas in Kerala, the Periyar Tiger Reserve leads in the number of amphibians in Kerala with 64 species, followed by Neyyar Wildlife Sanctuary and Peppara Wildlife Sanctuary with 62 and 61 species respectively.

Amphibian diversity

Sl. No.	Protected Area	Number of items
1	Periyar	64
2	Neyyar	62
3	Peppara	61
4	Shenthuruni	60
5.	Silent Valley	57
6.	Parambikulam	54
7.	Wayanad	52
8.	Malabar	51
9.	Aralam	51
10.	Kottiyoor	43
11.	Karimpuzha	42
12.	Chinnar	39
13.	Chimmini	38
14.	Peechi-Vazhani	35
15.	Iravikulam	36
16.	Idukki	35
17.	Thatttekad	33
18.	Mathikettan Shola	30
19.	Pampadam Shola	23
20.	Anamudi Shola	22
21.	Kurinjimala	21
22.	Choolannur	13
23.	Mangalavanam	8
24.	Kadalundi-Vallilakunnu Community Reserve	4





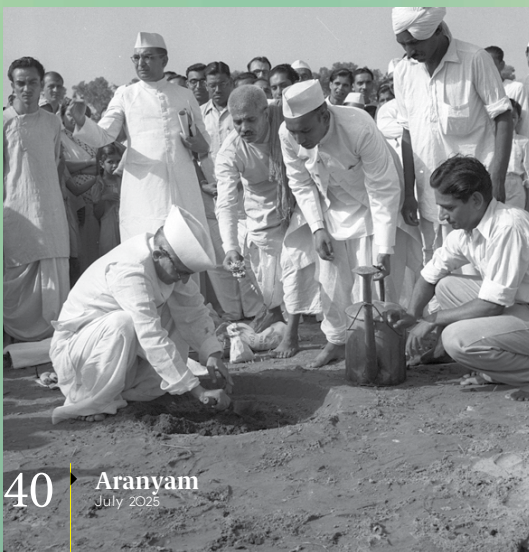
Van Mahotsav and New Approaches



Muraleedharan Thazhakara

Programme Executive (Rtd.),
Agri. Department, Akashavani,
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Another Van Mahotsav has come and gone. India has a long history of celebrating and promoting greenery by planting trees as part of this tradition. The very first tree-planting event was held in July 1947, even before India gained independence. The initiative was led by M.S. Randhawa, who was then the Deputy Commissioner of Delhi. He was inspired by similar tree-planting festivals around the world and decided to bring the tradition to India. A visionary with a strong ecological perspective, Randhawa later went on to serve as the first Vice-Chancellor of Punjab Agricultural University and as the Vice President of the Indian Council of Agricultural Research.



In 1950, K.M. Munshi, who served as the Union Minister for Agriculture and Food, gave the Van Mahotsav a new look and feel. He also shifted the festival to the first week of July, from the 1st to the 7th. The idea behind this change was that monsoon season arrives in many parts of the country during July and the rains would help saplings take root and grow quickly. For Kerala, this time of year coincides with the 'Thiruvathira Njattuvela' - a period so fertile that even a finger planted in the soil would sprout roots, as said by our elders. It's the ideal season to plant fruit trees and spices, including pepper. Every Van Mahotsav serves as a reminder of our ecological duty: to show respect for the Earth, protect nature and ensure the sustainability of our ecosystems.

As human-wildlife conflicts make headlines more and more frequently, it has become our great responsibility to protect and enhance our forest richness and greenery, which are essential for a peaceful life. The Western Ghats mountain ranges and forests act as guardians of our country. It's the ecosystem there that makes life possible for us. Dense forests are vital for stopping climate change, offering a practical solution to human-wildlife conflict, purifying polluted air by absorbing carbon, protecting biodiversity and ensuring clean water. Most importantly, forests are the source of life's



sustenance, providing support, shade, food and livelihood resources. The Van Mahotsav, which is dedicated to forest conservation, should not be viewed as just another government program. It needs to become a true festival for the people.

As population continues to grow, the world is faced with an urgent challenge of provide housing and basic amenities without destroying the natural world. This constant demand puts immense pressure on forests, inevitably leading to encroachment. This is exactly where the wisdom of our elders comes in. Their tried-and-true sayings should be our guide, reminding us that a balanced approach is key to preserving our planet for future generations.

There is a profound message which says “no matter the pressure or need, one must not encroach forests, one should not clear the land right next to homes and never mess with the banks of streams and rivers.” This timeless wisdom reminds one to respect the natural boundaries and live in harmony with the environment.

The message of World Forest Day is clear and direct. While the UN has officially celebrated this day since 2012, India's reverence for forests goes back much further. Our ancestors understood the connection between humanity and nature. It was a culture where people would perform rituals and seek permission from a tree before cutting it down. They also had the foresight to plant a new tree for every one they cut, demonstrating a wisdom that protected the environment for generations. India is one of the top ten countries in the world with the largest forest cover.

It is not just our forests that protect us. The sacred groves and mangrove forests also play a role in this. These small stretches often referred to as nature's air conditioners and water reservoirs, are vital. It is a source of great comfort that Kerala is home to hundreds of these sacred groves, both big and small, a testament to our enduring respect for nature.

Seed Balls

With respect to Vanamahotsavam, planting more saplings is a key part to protect forests. Apart from planting trees, the forest department has come up with an innovative new method: seed balls. This simple yet effective technique is helping restore the natural health and authenticity of forests. Seed balls are used to make sure wild animals have access to their basic needs, such as food, fodder and water, ultimately helping to preserve and restore the entire ecosystem.

The forest department and the Peechi Forest Research Center are working together to manage and distribute these essential seed balls. This collaborative effort ensures that the seed balls are prepared scientifically, allowing them to withstand summer heat and germinate only when conditions are favorable.

This World Forest Day, let's encourage our college and school students in NCC, NSS, and SPC to go on forest expeditions. Let's make these trips a learning experience where they can truly connect with the forests and their ecosystems. Let's conclude this message with a

powerful verse from the late Malayalam poet Sugathakumari, who so dearly loved trees, soil, and nature itself:

*"Let's plant a sapling for our mother,
Let's plant a sapling for our grandchildren,
Let's plant a sapling for a hundred birds,
Let's plant a sapling for a better tomorrow." ■*



Van Mahotsav, which is dedicated to forest conservation, should not be viewed as just another government program. It needs to become a true festival for the people.



Fox and Jackal

Some Facts



Anoop Raj P.N.

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Several animals living in human settlements have been close companions of human beings since childhood. While everyone enjoys their presence, from children to adults, one rarely stops to consider the daily challenges they face. Jackal is one such animal, silently disappearing from our midst. Due to regional language differences, jackals are often mistakenly referred to as foxes. However, they are two distinct species. Interestingly, the cunning 'fox' from our childhood fables is, in fact, the jackal we are familiar with. As frequent visitors to our farmlands and backyards, they have become an integral part of our lives. Living in the transitional zone between forests and human

habitation (known as ecotone region), they are a crucial part of the local ecosystem in Kerala. Despite the important role they play in social and ecological systems, there has been a significant lack of serious study on the issues they face and how their decline could impact human survival.

Jackals, wolves and wild dogs belong to the Canidae family. Found almost everywhere on the planet except in Arctic and Antarctic, they are listed as a species of 'Least Concern' on the IUCN Red List. In Kerala, they are found in hills, thickets and backyards and are adapted to urban life, choosing places like drains, pipelines and culverts as their homes. As



◀ Bengal fox

Photo:
Satheesh Kumar



omnivores, jackals are essential for a healthy ecosystem. They help clean up the environment by feeding on carrion and other decomposing matter. Their diet is quite varied, including small creatures like snakes, frogs and chameleons. They also feed on birds like peacocks and chickens and even young mammals such as wild pigs, deer, rabbits and rats. As they prey on animals considered as agricultural pests, they are often regarded as a farmer's best friend. They also play a big role in controlling the population of many nuisance creatures in human habitats. Unfortunately, despite all these benefits, they are only thought as thieves who steal chickens. This negative perception, along with a host of other threats, has led to their quiet decline. As habitat destruction, hunting, poisoning and diseases have become a constant reality, jackals have been disappearing without anyone ever realizing it.

Fox vs. Jackal

It's a common point of confusion whether foxes and jackals are the same? They look fairly similar, especially in

color and often inhabit the same ecosystems, which makes it easy to mistake one for the other. But most people don't know that what we commonly call a 'fox' is actually the Indian Fox (*Vulpes bengalensis*), while 'jackal' is the Golden Jackal (*Canis aureus*). These two species are completely different in their behavior and lifestyle. The Fox is a small canine that looks a lot like a puppy. They weigh between two to four kilograms

and have a body length of 45-60 cm. Their bodies are typically grey or blackish-grey, with a long tail (25-35 cm) that has a distinctive black tip. Other unique features include small, pointed ears and slender, brownish-grey legs. Their main habitats are hilly areas, farmlands, canal banks and thickets. They are nocturnal, hunting in the evenings and resting during the day in burrows they dig themselves. Their primary diet consists of rats, snakes, insects, and

crabs. Their breeding season is from February to April, with a litter size of one to four pups per season.



As habitat destruction, hunting, poisoning and diseases have become a constant reality, jackals have been disappearing without anyone ever realizing it.



◀ Crossbreed

Photo:
Nidhi Chand



In contrast to the fox, the Golden Jackal (*Canis aureus*) looks more like a wolf. Standing 38 to 43 cm tall, their bodies measure 60 to 75 cm long and can weigh between eight and 11 kilograms. Their fur is typically a dull grey or a blackish-grey, with lighter black markings on their shoulders, limbs and ears. Compared to the Indian Fox, jackals have a larger body and a shorter tail. Jackals are found in hills, farmlands, thickets, pipelines and culverts. They often come out to hunt in villages and cities during the evenings. Their diet is incredibly varied, ranging from rats, snakes, and chickens to scavenging on waste from urban areas and slaughterhouses. While they generally prefer to roam alone, they are often seen in groups during the breeding season or when hunting. Jackals typically have up to four pups in a single litter.

Jackal Dog

We have a long tradition of raising dogs to chase away jackals and foxes. While dogs and jackals belong to the same family, Canidae, they are considered different species. Nature typically prevents interbreeding between different species, but hybridization does occur. These hybrids often challenge the very concept of a species itself and for the most part are born sterile and tend to be isolated in nature, making them a rare sight.

Dog-jackal hybrids were first reported in Kerala in 1997, which suggests that they may have existed in the region for a long time. Now, with residents in parts of Kannur and Kasaragod reporting sightings of unusually dark-colored jackals, the need for further research is clearer than ever. The presence of these jackal dogs and foxes in Kerala certainly warrants more scientific attention to understand these fascinating creatures.

Jackals have long been permanent residents of Kerala's rural landscapes and hills. They play a crucial role in the transitional zones between forests and villages by keeping the population of smaller animals in check. For this reason, they are considered a vital part of the ecotone region, the area where these two habitats meet. It's plausible that the recent rise in nuisance wild pigs and peacocks is directly linked to the decline of the jackal population. In the current climate, more research is essential to validate this hypothesis.

Ultimately, all living beings are connected through the intricate web of food chain. This means that the conservation of every creature is vital for survival. ■



◀ Golden jackal

Photo:
Sreeram Kumar





World Mangrove Day



Kozhikode

The Kozhikode Division of Social Forestry Department, in collaboration with Kadalundi-Vallikkunnu Community Reserve Management Committee, organized a one-day workshop for Student Police Cadets of Vallikkunnu Chanthan Brothers Higher Secondary School. Conservator of Forests, Northern Circle, Social Forestry Division, R. Keerthi, IFS, inaugurated the event titled "Mangrove Forests and Our Lives,". The workshop was attended by several dignitaries, including T. P. Vijayan, Chairman of the Community Reserve Management Committee; A. P. Imthiyas, Assistant Conservator of Forests, Social Forestry Extension; Shwetha Prasad, Beat Forest Officer, Kozhikode City Special Duty Range; Shanmukhan Pilakkattu, Management Committee member; Community Police Officers Arun T. and Sunitha; Section Forest Officer Vabeesh M.; as well as T. Suresh (Retd. Deputy Range Forest Officer) and Chandrashekharan Tharail.



Kollam

The Kollam Social Forestry Extension Unit, in collaboration with the Department of Zoology at KSMD College, Sasthamkotta, celebrated World Mangrove Day. College Principal Dr. Radhikanath, Head of the Zoology Department Dr. Manju, retired Deputy Forest Conservator S. Dinesh, teachers Dr. Prathibha Kumari and Dr. Lakshmi, and officials from the Social Forestry Station Unit were present.





The Pathanamthitta Social Forestry Division and the Vadasserikkara Range jointly organized a "Vithootu" drive in the OliKallu forest area. The event was attended by V.S. Shuhaib, Ranni Social Forestry Range Officer; A.S. Ashok, Gudrickal Range Officer; G.S. Ranjith, Vadasserikkara Range Officer, from the Chittar Forest Station and students and teachers from the Forestry Club of Vadasserikkara Model Residential School.



The Pathanamthitta district-level Vanamahotsavam was inaugurated by Ranni MLA Adv. Pramod Narayan, at the Navodaya Vidyalaya in Vechoochira P.M. Sree Navodaya Vidyalayam. Vechoochira Grama Panchayat President E.V. Varkey, school principal V. Sudheer, Ranni DFO N. Rajesh, IFS, Konni DFO Ayushman Kori, IFS, Ranni Range Officer B.R. Jayan, Vadasserikkara Range Officer G.S. Ranjith, Vice Principal P.G. Rashmi, Ranni Block Section Forestry Officer I. Dileep and Ranni Social Forestry Range Officer V.S. Shuhaib were present. The program also included an environmental awareness class, a cleaning drive of the Vidyavanam area and tree planting.



M.T. High School in Ayiroor, Koyipram block, held a tree planting and plastic removal event. Attendees included School Headmistress Simi, Ayiroor Panchayat President Ambili Prabhakaran Nair, Grade Deputy P.A. Nejimone, as well as teachers and students.



Vanamahotsavam was held at SMSGUP School in Chandanakkunnu. The event was attended by Mezhuveli Grama Panchayat President Pinki Sreedhar, school headmistress Sunanda, PTA President Koushik, as well as teachers and students.





▶ The Pathanamthitta Social Forestry Division, along with Ranni Social Forestry Range, organized a program as part of Vanamahotsavam at the Engineering College in Kallooppara, Mallappally block. College Principal Deepa, Pathanamthitta Bedgers Group president Jiji Sam, teacher Deepu, Section Forest Officer D. Vinod as well as teachers and students were present.



▶ The Pulikeezhu Block Vanamahotsavam was inaugurated by Assistant Conservator of Forests (ACF) B. Rahul, at St. Gregorios College, Valanjavattom. Range Forest Officer (RFO) Shuhaib, V.S., College Principal Raju, Retired Section Forest Officer P. John, Junior Superintendent of Social Forestry Division Saji George and students were present.



▶ Under the leadership of Kollam District Social Forestry Division, Karunagappally Girls' High School hosted a cycle rally, along with a sapling planting and sapling distribution drive. The cycle rally was organized and led by the Student Police Cadets. The event was inaugurated by Headmistress P. Sreekala, and Section Forest Officer Ullahs Miranda also attended.



▶ The Kollam Forest Division and the Student Police Cadet (SPC) unit at Chavara Sankaramangalam Government HSS jointly organized a 'Haritha Sancharam' (Green Journey) event.



▶ An awareness class about snakes was held at the Government Higher Secondary School in Valathungal, Kollam. School Principal Shyamala inaugurated the event.



▶ The Punalur Range-level Vanamahotsavam was inaugurated by A. Abhilash, President of Kottarakkara Block Panchayat, at St. George's Central School in Ambalathumkala. The event was attended by School Principal Fr. Mathews Kuzhivila, Retd. Deputy Range Forest Officer N. Kanakaraj and Section Forest Officer Saju. As part of the festival, students also presented various environmental-themed cultural programs.



▶ The NSS and Scout units of Kottarakkara Government Boys' HSS and VHSS schools organized a Vanamahotsavam publicity rally. The event was led by School Principal R. Pradeep, Kottarakkara Municipality Chairperson Adv. Unnikrishnan Menon, Kottarakkara Police Station SHO C. Jayakrishnan, Social Forestry Range Forest Officer A.K. Ramachandran and Deputy Range Forest Officer Santhosh Kumar.



▶ As part of Vanamahotsavam, the Punalur Range organized an awareness program on -Sarpa App at V.H.S.S. in Thadikkad, Anchal block. The event was led by School Principal Saleena, Punalur Social Forestry Range Forest Officer A.K. Ramachandran, Section Forest Officer and Sarpa Kollam District Facilitator Liju Tajudeen, and Deputy Range Forest Officer (G) Santhosh Kumar were present.

Q&A

1. The state in India that has the most sacred groves
2. The district in Kerala that has the most sacred Groves
3. The largest sacred grove in Kerala
4. The sacred Grove where tree species, *Madhuca diplostemon*, has been discovered thought to be extinct for 180 years



5. The sacred groves in Kerala are considered the remnants of which type of forests
6. The Indian state home to Mawphlang Sacred Grove, which spans approximately 193 acres
7. The state where the Supreme Court ordered to conduct a complete mapping and begin conservation efforts for its sacred groves, locally known as "Orans"
8. The old saying goes, "If you offend the grove, you will get"
9. The non-profit organization that conducted a study on sacred groves in various districts of Kerala
10. The sacred grove in Tamil Nadu that was recently declared a Biodiversity Heritage Site

(Answers: on page 50)

Reni R. Pillai

Dy. Director, Wildlife Education



School Forestry Club

Write & Win

Sacred groves are small forest patches protected by faith and tradition for generations. They are home to many rare and endangered plants. Visit a nearby Kaavu, note your experiences and observations, and write an article with suggestions to raise awareness about protecting these sacred groves.

**The best submissions
will be rewarded.**

Topic of the Month:

A Journey to Sacred Groves

Article should be sent to:

Director,
Forestry Information Bureau
Vazhuthakkad, Thycaud P.O.
Thiruvananthapuram. PIN 695014
Email: forestmediacell@gmail.com

Q&A

ANSWERS

1. Himachal Pradesh
2. Alappuzha
3. Iringol Grove (Situating Near Perumbavoor Ernakulam, it covers about two hectare)



4. Ayiravalli Shiva Temple in Paravoor in Kollam District
5. Tropical forests
6. Meghalaya
7. Rajasthan
8. Ponds would dry
9. Institute of Foresters Kerala . The institute was founded in 1987
10. Bio Diversity Act, 2002



പാമ്പിനെ ഭയക്കണ്ടതില്ല രക്ഷയ്ക്ക് ഇനി സർപ്പ ആപ്പ്

കണ്ടെത്തിയ പാമ്പിന്റെ ഫോട്ടോ സർപ്പ മൊബൈൽ ആപ്പിൽ അപ് ലോഡ് ചെയ്താൽ പലിശീലനം നേടിയ സന്നദ്ധപ്രവർത്തകർ ഞൊടിയിടയിൽ സ്ഥലത്തെത്തി പാമ്പിനെ പിടികൂടി സുരക്ഷിതമായി നീക്കംചെയ്യും. പ്ലേ സ്റ്റോറിൽ നിന്നും ഡൗൺലോഡ് ചെയ്ത് ഉപയോഗിക്കാം. കേരള വനംവകുപ്പ് ആവിഷ്കരിച്ച് നടപ്പിലാക്കുന്ന സർപ്പ ആപ്പിന്റെ മുഴുവൻ സേവനങ്ങളും തികച്ചും സൗജന്യമാണ്. വനംവകുപ്പ് സർട്ടിഫിക്കേഷൻ നൽകിയ അംഗീകൃത റെസ്ക്യൂവർമാർ എല്ലാവരും സർപ്പയിൽ രജിസ്റ്റർ ചെയ്തിട്ടുണ്ട്. പാമ്പുകളെ സംബന്ധിച്ച സംശയനിവാരണത്തിനും സർപ്പ ആപ്പ് ഉപയോഗപ്പെടുത്താവുന്നതാണ്.

ആപ്പിന്റെ ആവശ്യകത

പാമ്പുകളും മനുഷ്യനുമായുള്ള സംഘർഷത്തിന് ചരിത്രത്തോളം പഴക്കമുണ്ട്. എല്ലാതരം ആവാസ വ്യവസ്ഥകളിലും പാമ്പുകളെ കാണപ്പെടാറുമുണ്ട്. എന്നാൽ കേരളത്തിൽ കാണപ്പെടുന്ന പാമ്പുകളിൽ ബഹുഭൂരിപക്ഷവും വിഷമില്ലാത്ത ഇനങ്ങളാണ്. പക്ഷെ ഭയംമൂലം മനുഷ്യൻ അശാസ്ത്രീയ മാർഗങ്ങളിലൂടെ പാമ്പിനെ പിടികൂടുന്നത് അതിന്റെ നില നിൽപ്പിന് ഭീഷണിയായി തീരുന്നുണ്ട്. ആവാസ വ്യവസ്ഥയിലെ മുഖ്യകണ്ഠിയായ പാമ്പുകളുടെ സംരക്ഷണവും വനംവകുപ്പിന്റെ ഉത്തരവാദിത്വമാണ്.

- ഒരു പാമ്പിനെ അപകടകരമായ തീരയിൽ കണ്ടെത്തിയാൽ പാമ്പിന്റെയോ കണ്ടെത്തിയ സ്ഥലത്തിന്റെയോ ഫോട്ടോ എടുത്ത് ആപ്പിൽ അപ് ലോഡ് ചെയ്യുക.
- സന്ദേശ സ്ഥലത്തിന്റെ ലൊക്കേഷൻ ജി പി എസ് മുഖേന കണ്ടെത്തി റെസ്ക്യൂവർമാർ സ്ഥലത്തെത്തും.
- വനംവകുപ്പ് പരിശീലനം നൽകിയ അംഗീകൃത റെസ്ക്യൂവർമാരുടെ മേൽവിലാസവും മൊബൈൽ നമ്പറും സർപ്പയിൽ ലഭ്യമാണ്.
- ജനവാസ മേഖലയിൽ കാണപ്പെടുന്ന പാമ്പുകളെ സംബന്ധിക്കുന്ന എല്ലാ വിവരങ്ങളും സർപ്പയിൽ ലഭ്യമാണ്.
- പാമ്പുകളെ പിടികൂടിയത് മുതൽ എല്ലാ വിവരങ്ങളും ആപ്പിൽ ലഭിക്കും.
- പാമ്പിന്റെ വിഷത്തിന് ചികിത്സ ലഭിക്കുന്ന ആശുപത്രികളെ സംബന്ധിച്ച പുർണ വിവരങ്ങളും ആപ്പിൽ ലഭിക്കും.



കേരള വനം വകുപ്പ്



പാമ്പിനെ ഭയക്കണ്ടതില്ല രക്ഷയ്ക്ക് ഇനി സർപ്പ ആപ്പ്



പാമ്പുകടിയേറ്റാൽ സമീപത്ത് ആന്റിവൈനം ലഭ്യമായിട്ടുള്ള ആശുപത്രികൾ



പാമ്പിനെ അപകടകരമായി കണ്ടാലോ, അനുബന്ധ സേവനങ്ങൾക്കോ സർപ്പ ബോളന്റിയനെ വിളിക്കുക



അംഗീകൃത പരിശീലനം ലഭിച്ചിട്ടുള്ള ബോളന്റിയർമാരുടെ ലിസ്റ്റ്



സർപ്പ

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