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State and Significance of Mangrove Ecosystem and its Floral Diversity: A Geographical Inquiry in Kunhimangalam Region of Kannur District, Kerala

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Abstract

Mangroves are unique forest habitat that dominates tropical and subtropical coastlines around the world. True mangroves are exclusively found in the intertidal zones of beaches and are taxonomically distinct from their terrestrial equivalents. There are 54-75 species of true mangroves. Mangroves survive in highly salty waters and soils because they are well suited to their environment, capable of rejecting or expelling salt. Salinity, as well as other environmental conditions like climate, tidal fluctuation, silt, and wave energy, can still limit the range of mangroves. Mangrove vegetation's structural intricacies generate unique ecosystems that provide biological niches for a diverse range of creatures. Mangroves serve as breeding, feeding, and nursery grounds for most commercial fish and crustaceans, on which thousands of people rely for their livelihood. Mangroves are being destroyed and are facing serious threats as a result of urbanization, industrialization, and the discharge of domestic sewage, industrial effluents, and pesticides. Reclamation of wetlands for Coconut Plantations and conversion of mangroves for aquaculture are also a major threat to mangroves. Present study is enquiry on floral diversities of mangroves in Kunhimangalam region of Kannur in Kerala. The state and significance of their spatial distribution is also examined from a geographical stand point.

Keywords: Mangrove ecosystem; Floral diversity; Wet lands

1 Introduction

Mangroves are unique forest habitat that dominates tropical and subtropical coastlines around the world. Mangrove vegetation's structural intricacies generate unique ecosystems that provide biolog-

ical niches for a diverse range of creatures. Mangroves serve as breeding, feeding, and nursery grounds for most commercial fish and crustaceans, on which thousands of people rely for their livelihood. Mangroves are being destroyed

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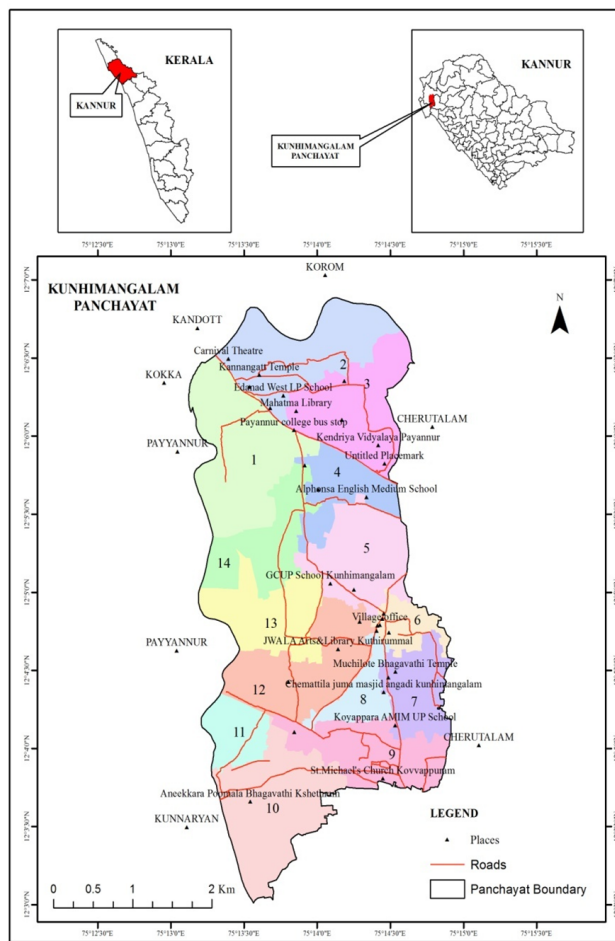
Mangroves are one of the world’s dominant coastal ecosystems comprised chiefly of flowering trees and shrubs uniquely adapted to marine and estuarine tidal conditions. Mangroves are found in tropical and subtropical intertidal zones where seawater and freshwater are constantly exchanged. The components of the flora have amazing salt tolerance adaptations. Mangroves cover 4461 square kilometers in India. It accounts for 0.14 percent of the country’s total land area. Mangroves are well-known for their contributions to coastal productivity and connectivity, typically supporting high biodiversity and biomass that would otherwise be impossible to achieve. Mangroves can be found in all districts of Kerala except Idukki, Pathanathitta, Palakkad, and Wayanad, with the greatest extent reported from Kannur, and Kasargod. Kannur has 7.55 square kilometres of mangroves, accounting for over half of Kerala’s total mangrove forest area. Nearly 90% of these forests, which support at least 10 species of mangroves (including the rare *Rhizophora apicolata*), 87 species of fish, 83 species of birds, and 13 species of mammals, are under private ownership and thus endangered.

Mangroves are not just useful for coastal areas, but they are also significant for other reasons. Because estuarine areas are densely populated, even minor ecological imbalances will have a significant impact. They aid in the stabilization of these areas. These locations cannot be stabilized by engineering or technical solutions. Even if we disregard all of the benefits of mangroves as forests, their worth as a "protector of shoreline" is sufficient to justify their preservation. Mangroves are the fragile ecosystem and a habitat of diversified species of flora and fauna. A geographical enquiry on their spatial pattern and identification of floral diversity form the theme of present investigation. Examining the details of mangrove forest conservation is interesting and important in this section. The current investigation aids in determining the state of the conservation zone’s true and associated mangroves. This information is useful when developing conservation plans and sustainable developmental strategies of the region.

2 Study Area

A region’s vegetation is influenced by the nature of its physical surroundings and cultural behaviours. Mangroves are trees and shrubs found in tropical and subtropical coastal locations that thrive in the intertidal zone or brackish water between 10°n and 10°s latitude. Mangroves, which are also known as halophytes, are plants that grow in severe environments such as high saline levels. Their morphological and metabolic

characteristics allow them to grow in harsh environments. Kunhimagalam is one of the administrative units in Kannur district which contains high concentration of mangrove ecosystem. Kunhimagalam is a small village situated in the north end of Kannur district in the state of Kerala. The village lies on the south shore of the Perumba River and lies on the National Highway 66. The region is endowed with thick growth of mangroves along the river banks and drainage channels.



3 Methodology

The study is based on extensive field study. Series of field visits were arranged in order to identify and map the floral diversity of Mangroves in the region. Focus Group Discussions were arranged in different parts of the study area. In depth interviews were conducted with Botanists, leaders of NGOs and Environmental Collectives and local peoples including volunteers of Mangrove conservation activities. Primarily thy study is field visit oriented one and this paper is the result of extensive survey in mangroves with the help of students and environmental activists in the locality.



4 Results and Discussion

Mangrove Varieties in Kunhimagalam Region

The floristic composition revealed a total of 9 true mangroves, and 4 semi mangroves species in Kunhimagalam (Tables 1 and 2). These 9 mangrove species include 8 genera and 6 families, Avicenniaceae, Euphoraceae, Rhizophoraceae, Acanthaceae, Sonneratiaceae, and Myricaceae respectively. Out of these 5 were trees, 2 small trees and 2 are shrubs. The major species identified in this category are Uppatti, Kannampotti, Pranthankandal, Chullikandal, Kuttikandal, Pookandal, Vallikandal, Ezhuthanikandal, and Chakkarakandal. The semi mangrove species comes under 3 genera and 3 families, Fabaceae, Verbenaceae and Pteridaceae respectively. Out of these 2 were shrubs and 1 fern. Major species in the study area are Ponnampally, Poonjalivally, Puzhamulla, and Machinthol.

1. Uppatti (*Avicennia officinalis* L.): Uppatti (Grey mangrove) can reach a height of 3 to 10 m (9.8 to 32.8 ft) as a shrub or tree, or up to 14 m in tropical areas. The habit is a twisted, multiple-branch structure. Uppatti keeps sodium salts out of the rest of the plant by having very impermeable roots that are heavily suberised (impregnated with suberin). This acts as an ultra-filtration mechanism to keep sodium salts out of the rest of the plant. The roots of mangroves have been found to have removed 90 percent to 97 percent of the salt in the water. Salt that accumulates in the shoot (sprout) concentrates in old leaves, which the plant eventually sheds, according to a commonly cited idea known as the "sacrificial leaf". Recent study reveals, however, that the older, yellowing leaves contain no more salt than the younger, greener leaves. It possesses aerial roots (pneumatophores) that develop to around 20 cm (5 in) in height and 1 cm in diameter. These enable the plant to absorb oxygen, which is in short supply in its environment. During the repeated flooding of seawater in the soft substrate of tidal systems, these roots also anchor the plant. Flowers range in colour from white to golden yellow, are less than one centimetre in diameter, and appear in clusters of three to five. The fruit has big cotyledons that surround a seedling's new stem. A huge, fleshy seed is produced, which often germinates on the tree and falls as a seedling. Uppatti is a highly variable tree that comes in a variety of ecotypes and shapes that are very similar to those of other species. It has been found to withstand harsh weather, severe winds, and a variety of pests and illnesses. With a pH of 6.5 to 8.0, it is a pioneer in muddy soil conditions, although it is shade-intolerant. Several botanists have recommended splitting the species, although there are presently three subspecies recognised. These mangroves are mainly found in Thuruthi, Kandamkulangara, Moosarikkovval, Chankoorichal, Kallenthuruthu, Puliyakode, Thekkumbad and Chembalikkund. This species is widespread and common within its range. It is threatened by the loss of mangrove habitat throughout its

range, primarily due to extraction and coastal development.

2. Kannampotti (*Excoecaria agallocha* L.): This little tree can reach a height of 15 metres. Male and female trees exist. Female flowers appear as shorter spikes, while male blooms generate drooping tassels. Bees and other pollinators frequently visit the blossoms. The fruit is a black capsule that is modest in size. Blind-your-eye mangrove, blinding tree, buta buta tree, milky mangrove, poisonfish tree, and river poison tree are only a few of the common names given to the species. The majority of the names pertain to their toxicity or proclivity for causing blindness when its latex comes into contact with the eyes. In tropical mangrove forests, this plant grows in brackish or saltwater water. Chemical defenses, such as diterpenoids, triterpenoids, and flavonoids, keep the plant safe. *Excoecaria agallocha*'s milky latex is very toxic and irritating, which is not uncommon among milky Euphorbiaceae species. Contact with the skin causes irritation and blistering; contact with the eyes causes temporary blindness, thus the popular names for blindness. The genus name is derived from the Latin word for "blinder." Thuruthi, Kandamkulangara, Moosarikkovval, Chankoorichal, Kallenthuruthu, Puliyakode, Thekkumbad and Vayalapra are just a few of the places where mangroves may be found.

3. Panachikandal/Pranthankandal (*Rhizophora mucronata* Poir): Pranthankandal is a small to medium-sized evergreen tree that grows to a height of 20 to 25 metres (66 to 82 feet) along riverbanks. On the sea's edge, a height of 10 to 15 metres (33 to 49 feet) is more common. The tallest trees are found closest to the water, while the shortest trees are found further inland. The trunk of the tree is buttressed by a huge number of aerial stilt roots. The elliptical leaves are normally 12 centimetres (4.7 inches) long and 6 centimetres (2.4 inches) broad. Their tips are extended, but they frequently break off. The pale undersides of the leaves have corky warts on the twigs; the blooms grow in axillary clusters. Each flower features a firm cream-colored calyx, four sepals, and four hairy white petals. The seeds are viviparous, which means they begin to grow while still attached to the tree. The root begins to elongate and can grow to be a metre (yard) long or longer. When the propagule has grown to the point where it can root in the mud below, it is removed from the branch. Pranthankandal is rapidly regenerated from seed; however, crabs frequently eat the seedlings. Crabs consume the leaves, and the crab-eating macaque consumes them as well (*Macaca irus*). *Poecilus fallax*, a beetle, has attacked the tree. The Flowering and Fruiting season is normally from April to October. This species is very widespread. Thuruthi, Kallenthuruthu, Puliyakode, Thekkumbad, Kandamkulangara, Moosarikkovval, Chankoorichal, Thekkumbad, and Vayalapra are some of the places where these types of mangroves are found extensively.



Table 1. True Mangrove Species in Kunhimagalam region

S. NO	Mangrove types	Family	Habit	Common Name	Botanical Name
1	Uppatti	Avicenniaceae	Shrub	Indian Mangrove, Grey Mangrove	<i>Avicennia officinalis</i> L.
2	Kannampotti	Euphoraceae	Tree	Milky mangrove, Blind-your-eye mangrove or River poison tree	<i>Excoecaria agallocha</i> L.
3	Pranthankandal (Panachikandal)	Rhizophoraceae	Tree	Red mangroves	<i>Rhizophora mucronata</i> Poir
4	Chullikandal	Acanthaceae	Shrub	Holly-leaved Acanthus; Sea Holly Mangrove	<i>Acanthus ilicifolius</i> L.
5	Kuttikandal	Rhizophoraceae	Tree	Orange Mangrove	<i>Bruguiera cylindrical</i> Blume
6	Pookandal	Myrinaceae	Small Tree	Black Mangrove	<i>Aegiceras Corniculatum</i> L.
7	Vallikandal	Rhizophoraceae	Tree	Red Mangrove	<i>Rhizophora apiculata</i> L.
8	Ezhuthanikandal	Rhizophoraceae	Tree	Narrow-leaved Mangrove	<i>Kandelia candel</i>
9	Chakkarakandal	Sonneratiaceae	Small Tree	Mangrove apple	<i>Sonneratiacaseolaris</i>

*Field survey

Table 2. Semi-Mangrove Species in Kunhimagalam region

S. NO	Mangrove Types	Family	Habit	Common Name	Botanical Name
1	Ponnamvally	Fabaceae	Shrub	Common derris	<i>Derris trifoliata</i> Lour
2	Poonjalivalli	Fabaceae	Shrub	Jewel vine	<i>Derris scandens</i> Roxb
3	Puzhamulla	Verbenaceae	Shrub	Wild jasmine	<i>Clerodendrum inerme</i> L.
4	Machinthol	Pteridaceae	Fern	The Golden Leather Fern	<i>Acrostichum aureum</i> L.

* Field survey

4. Chullikandal (*Acanthus ilicifolius* L.): Chullikandal is a plant that grows along the seashore and isn't found anywhere else. This plant is covered in thorns (and, oddly, at the leaves as well), but it produces a cluster of lovely blooms. Holly mangrove or Sea holly are two more names for it. *Acanthus ilicifolius* is the botanical name for the plant. It belongs to the Acanthaceae family of plants. The majority of mangrove trees remove the salt from the seawater, however this one does not. That is why the plant's sap is salty. This is a medicinal plant that is used to treat rheumatism and neuralgia in Southeast Asians. Chullikandal is an erect herbaceous plant that can reach a height of 0.5 to 1.5 meters. The plant's yellowish (or reddish yellow) stem is spiky. The wavy dark green leaves have thorns at the upper and lower apex of the wave. When the plant is completely exposed to the sun, this happens. The leaves are oriented in opposing directions and have a short petiole. Flowers have a delicate beauty. They are light blue or light violet in hue and are quite showy. As a spike-shaped cluster, it blooms. The blooming season is normally from December through May. It commonly grows on the riverbanks or tidal canal sides or low swampy areas in the mangrove forests. Widespread from, Kallen Thuruthu, Kandamkulangara, Moosarikkovval, Chankoorichal, Mundanthadam vayal, Thekkumbad, and

Thuruthi.

5. Kuttikandal (*Bruguiera cylindrical* Blume.): Kuttikandal is a tiny tree that can reach a height of 20 metres (66 feet), but it usually grows as a bush. The trunk is buttressed by roots, and the bark is smooth and grey with corky elevated areas containing lenticels, which are employed in gas exchange. The aerial roots, also known as pneumatophores, emerge from the soil in knee-shaped loops with numerous lenticels that allow air to enter while keeping water out. To offer stability in the damp soil, the roots extend out extensively. The flowers are arranged in tiny bunches of 2-5 in the leaf axils. They feature eight long green sepals and eight tiny greenish-white petals with a few little bristles on the tips. Insects pollinate the blossoms, which emit a cloud of pollen when their mouthparts probe the base. A propagule is a seed that does not detach itself from the flower stalk and germinates right where it is. Thuruthi, Moosarikkovval, Kallen thuruthu, Chankoorichal, Kunhichal, and Chemballikkund are some of the places where mangroves may be found.

6. Ponnamvally (*Derris trifoliata* Lour): Ponnamvally (*Derris trifoliata*) is an evergreen shrub with twining, climbing, or creeping stems that can reach 3 - 15 metres in length, however it can also be grown as a smaller, erect plant. The stems can have a diameter of up to 4cm. Locals use the plant as a medicinal, tannin supply, and pesticide. It is sometimes grown for the rotenone that may be extracted from its root.



The plant contains rotenone, which has been used as a fish poison for centuries. Rotenone kills or stuns fish, making them easier to catch, yet the fish remain perfectly edible to mammals. The World Health Organization rates rotenone as moderately dangerous. It is minimally harmful to humans and other mammals, but exceedingly toxic to many insects and aquatic life, including fish (thus its usage as an insecticide). Because the lipophilic rotenone is quickly taken up through the gills or trachea, but not so easily through the skin or gastrointestinal tract, fish and insects have a higher toxicity. Because rotenone's irritating action promotes vomiting, the lowest lethal dose for a child is 143 mg/kg. However, human deaths from rotenone poisoning are uncommon. Intentional intake of rotenone, on the other hand, can be lethal. When exposed to sunshine, the chemical decomposes and has a six-day activity in the environment. Ponnammavally mainly found in Thuruthi, Kandamkulangara, Thekkethode, Chankoorichal, Thekkumbad, and Mundan Thadam vayal .

7. Vallikandal (*Rhizophora apiculata*, Blume): Vallikandal (*Rhizophora apiculata*) is a Rhizophoraceae species that belongs to the Plantae kingdom. The size of *R. apiculata* is determined by geographical conditions (particularly, climate and soil); on average, a mature Vallikandal grows to a height of 5–8 metres, although it has the potential to grow to a height of 30–40 metres. Aerial Prop Roots and Stilt Roots are two types of adventitious roots. Both types of roots are designed to withstand/resist large waves, severe tides, strong winds, and tropical storms as a result of environmental variables. The amount of water uptake potential is also governed by two primary factors in roots. Hydrostatic (which distributes the water taken up by the root to each of its organs) and osmotic (which distributes the water taken up by the root to each of its organs) forces are two of them (uses negative water pressure in the roots to suck up water from the soil). Because the habitat in which Vallikandal grows is especially high in salt levels, the process of roots absorbing both water and nutrients is a vital function responsible for growth. The roots go through a process called ultra-filtration to keep any salt from getting into the plant, but any salt that gets in will be stored in old leaves that will eventually fall off and die, reducing the plant's salt capacity. Thuruthi, Kallen thuruthu, Moosarikkovval, Chankoorichal, and Chembalikkund are some of the places where Vallikandal are found extensively.

8. Ezhuthanikandal (*Kandelia candel*): Ezhuthanikandal is a medium-sized evergreen tree with a thicker stem base that grows to a height of 7 to 8 metres. It doesn't have a genuine stilt root, but the roots at the base of the tree resemble braided. On the banks of tidal rivers, this species can be found. It has lenticellate flaky bark that is grey to reddish brown in colour. White flowers are used. The ovoid fruits can reach a length of up to 25 cm (10 in). Narrow-Leaved *Kandelia* is utilised as a source of tannin, as well as for firewood, fences, and stakes. Kunhichal Kandamkulangara, Moosarikkovval,

Thekkumbad, and Chembalikkund are some of the places where mangroves may be found.

9. Chakkarakandal (*Sonneratia caseolaris* L.):

Mangrove apple is the popular name for Chakkarakandal. This tree is a variety of mangrove that may reach a height of 20 metres and has a trunk diameter of 50 centimetres. In some locations, the leaves and fruit are edible and valued as food. The adaptations to the mangrove area environment include a unique roots system and salt excluders. The branches and cone-shaped pneumatophores, for example, are created to support the respiratory system. The tree is prized for its wood, which may be used for a variety of purposes. It's also a crucial tree in the coastal swamp community, helping to preserve the soil from erosion and providing vital wildlife habitat. It is reported that the plant is haemostatic. It's used to treat sprains, swellings, and worms. The old fruit walls are utilised to treat worm infestations. Coughs can be treated with half-ripe fruits. Poultices are made from the fruits. Haematuria and smallpox are treated with the crushed leaves. The leaves are crushed, combined with salt, and used for cuts and bruises as a poultice. A vital tree in the coastal swamp community, helping to preserve the soil from erosion and providing vital wildlife habitat. A fast-growing, pioneering species that colonises newly formed mudflats and can rapidly multiply in numbers, particularly in low-salinity optimal conditions. Thuruthi, Kandamkulangara, Chankoorichal, Thekkumbad, etc and are some of the places where mangroves found more.

10. Puzhamulla (*Clerodendrum inerme* L.): Puzhamulla is an evergreen shrub that grows up to 3 metres tall and is widely used for hedges around gardens and other areas. It is found mostly in the mangrove forests of coastal India, where it is subjected to a wide range of salinity changes. They have an edge over other species that don't have techniques for dealing with salt in the soil, making them good competitors in saline conditions. This plant contains a wide range of secondary metabolites, including tannins, terpenoids, alkaloids, flavonoids, and other compounds that have been shown to have antibacterial activities in vitro. *Clerodendrum inerme* is used as a groundcover or hedge plant in landscaping. It has been tested for insect repellents on the surface of the seeds. Thuruthi, and Chembalikkund regions are main concentration of these type of mangroves.

11. Poonjalivalli (*Derris scandens* Roxb): Poonjalivalli is a twining evergreen climber shrub with branching branches. It has no aerial roots and has a tap root system. Its roots contain rotenone, a powerful insecticide, as well as flavonol scadenin, a type of nallanin known to harm fish. It produces a coarse fibre from its bark. This endemic climber is used for osteoarthritis, arthritis, joint diseases, musculoskeletal diseases, rheumatic pains, muscle tension, myalgia, numbness, antitussive, diuretic, antidysentery, weariness, and anti-inflammatory action. As a result, the plant is extremely important for the creation of numerous pharmaceuticals for the



general public. In India, the root of this climber is mashed with or without water and the juice is used orally to stimulate milk supply after childbirth. The stem is used to cure common colds and backaches as a diuretic, laxative, emmenagogue, expectorant, and diuretic. It is found extensively in, Kandamkulangara, Moosarikkovval, and adjoining regions

12. Pookandal (*Aegiceras corniculatum* L.): Pookandal (*Aegiceras corniculatum* L.) is a tiny evergreen shrub or tree that can grow up to 6 metres tall. The plant is occasionally picked in the wild for its wood, which is used to build minor objects in the area. Black mangrove, river mangrove, or khalsi are all common names for this plant. Its extract contains analgesic qualities, which aids in the treatment of diabetes. The wood is sturdy and hefty, with a reddish-brown to virtually black colour range. Knife handles are made of it. The shrub blooms and yields fruit between April and September. The blossoms of this species can be used to make high-quality honey and bee wax, while the wood can be used to build shelters and supply fuel. This variety of mangrove is found almost everywhere in the region.

13. Machinthol (*Acrostichum aureum* L.): Machinthol has huge fronds that can reach 1.8 metres (six feet) in length. It can be found in swamps, mangrove forests, salt marshes, and riverbanks, and can tolerate high salinity levels. Fresh water, on the other hand, helps the spores grow better. It grows on modest elevations in the mangrove swamp in locations that are occasionally submerged by the sea. It may also thrive in freshwater environments. Due to its ability to adapt to disturbed regions bereft of indigenous vegetation, it colonises a variety of current vegetation environments. It can tolerate a broad variety of soil salinity and requires full sun exposure to grow quickly and fully. Chankoorichal, Thekkumbad, and Asarikovval regions are endowed with this species too.

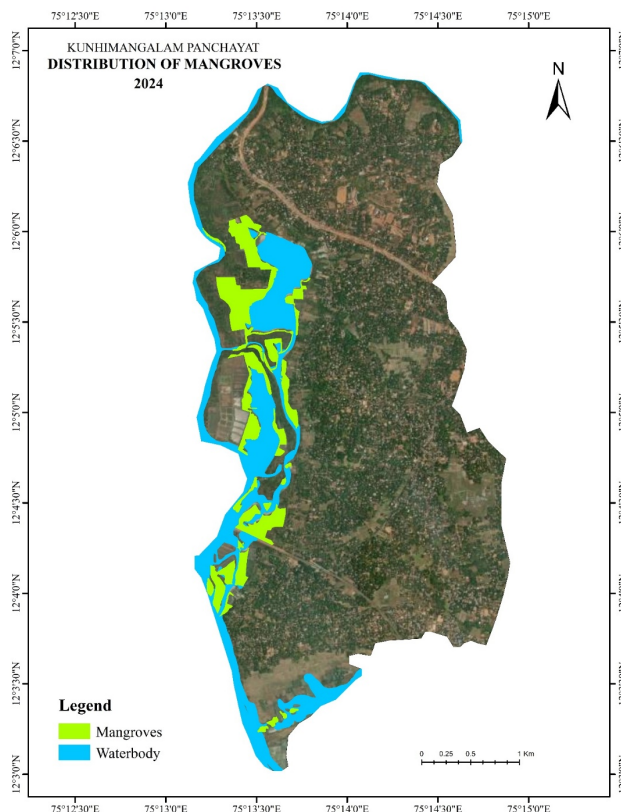
Medicinal & Economic Uses of Mangroves

Leaves, flower, fruit, bark, tubers, root, seeds, wood, and stem are among the most often used plant components. Firewood, poles, construction materials, fishing gear, tanning, medications, and fishery products are all direct uses of the mangrove ecosystem.

5 Conclusion

Mangroves are one of the world's most ecologically varied ecosystems, rich in organic matter and nutrients, and home to a massive flora and fauna biomass. Kunhimangalam region is characterised with unique concentration of Mangroves. The

floristic composition revealed a total 9 true mangroves, and 4 semi mangroves species in Kunhimangalam. (1-13)



The true mangrove types found in Kunhimangalam are Uppatti, Kannampotti, Pranthankandal, Chullikandal, Kuttikandal, Pookandal, Vallikandal, Ezhuthanikandal, and Chakkarakandal. Semi-Mangroves found in Kunhimangalam include Ponnammavally, Poonjalivally, Puzhamulla, and Machinthol. The important mangrove areas in Kunhimangalam are Thuruthi, Kandamkulangara, Moosarikkovval, Chankoorichal, Thekkumbad, and Chemballikkund. Most of the varieties are found in all concentrations. Each type of mangrove has its unique medical and commercial value. Even then Rapid growth of adjoining townships and resultant pressure on land resources is a treat to this unique ecosystem. Land reclamation, Prawn farming, Developments in the name of tourism also cannot be overlooked. Commendable efforts of Environmentalists to plant and preserve mangroves in the region is promising on the other side. Headquarters of The Kannur Kandal Project of WTI is located in the study area. ('Kandal' means mangroves in Malayalam) –This Project aims to ensure the persistence of existing mangroves and increase the acreage.

Table 3. Medicinal and Economic uses of True Mangrove Species

S. No	Mangrove Types	Parts Used	Uses
1	Uppatti	Flower, Wood & Leaves	From the flower, honey is extracted. In some places, seeds are eaten as food. Building materials and furnishings are both made of wood. It is suggested in Tuberculosis treatment by locals, Resin is extracted from this plant. Skin sores were cured with unripe fruit.
2	Kannampotti	Leaves & Wood	The whitish exudates that the leaf twig produces are extremely medicinal and are used to treat tuberculosis.
3	Pranthankandal	Wood, Bark, Seed, Young shoots, Leaves	Wood is used to make furniture and as a source of fuel. Tannin, gum, colours, and rayon can all be found in the bark. Food sources include seeds and new shoots. Cattle are fed leaves. The bark is used to make medicine that is used to treat diabetes and cardiac problems.
4	Chullikandal	Roots & Seeds	Asthma, fatigue, and gastrointestinal problems are all treated with roots. Rheumatoid arthritis is treated with seeds shaped like kidneys.
5	Kuttikandal	Wood & Bark	Furniture is constructed from wood. The bark is used to make a variety of medications and tannins.
6	Pookandal	Flower & Wood	Honey is made from fragrant flowers, and the wax obtained from the honey is also significant. Wood is both a fuel source and a construction material.
7	Vallikandal	Stem & Leaves	Tannin, gum, dyes, rayon, pulp, plywood etc. is obtaining from the stem. Leaves used as cattle feed.
8	Ezhuthanikandal	Leaves, Wood & Seed	It is used as fuel wood. Leaves are used as cattle feed. Steamed seed are used as food. Medicine obtains from the plant is used to cure diabetes.
9	Chakkarakandal	Leaves, Wood & Fruit	Leaves are used as cattle feed and its medicinal property will cure sterility in cattle. Wood is used as fuel and building purposes. Vinegar is obtained from the plant. It is used as medicine for normal diseases.
10	Ponnamvally	Stem & Seeds	Ropes are made from fibres obtained from plant stems. Because of their toxicity, fishermen employ their seeds in fishing nets. It's used to treat nervine disorders.
11	Poonjalivalli	Roots	It's a natural insecticide that's used to keep pests away from peas and other crops. Rotenone is released when the derris root is broken down. Roots that are used in the fishing industry.
12	Puzhamulla	Flower & Leaves	Flowers and leaves have been used as garden ornaments for a long time
13	Machinthol	Shoot, Leaves & Rhizome	Fresh or cooked, the young shoots can be eaten raw or cooked in a salad. When elder leaves are dried, they take on the appearance of parchment and are used as a fire-resistant roof thatch. Cord can also be produced from old leaf fibres. Rhizomes are plant roots that are used to treat wounds and boils.



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