BIODIVERSITY ASSESSMENT OF ENNORE CREEK, THIRUVALLUR DISTRICT, TAMIL NADU

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ABSTRACT

Ennore Creek, a brackish-water arm of the Kosasthalaiyar River in Thiruvallur District, Tamil Nadu, supports diverse but increasingly stressed biota. Using standard field sampling complemented by published and community-derived records, we inventoried the system's biodiversity and assessed ecosystem condition. A total of 56 vascular plant species of 17 families were recorded, with *Avicennia marina* dominating intertidal zones, while the invasive *Prosopis juliflora* proliferated in disturbed uplands. Floral observations revealed mangrove and salt-tolerant plant species adapted to estuarine conditions. Faunal surveys documented 17 butterfly species, 9 fishes, 6 crustaceans, 3 mollusks, 9 herpetofaunal taxa, 66 bird species and 8 mammals, indicating moderate faunal richness. Interviews with fishermen and residents, together with literature review, highlighted declines linked to industrial effluents, habitat encroachment and invasive species. Although biodiversity remains substantial, the trajectory is negative. Immediate, integrated management—removal of invasives, mangrove restoration and pollution abatement—is essential to safeguard ecological functions and the livelihoods of local communities.

Keywords: avifauna, biodiversity, conservation, Ennore Creek, flora, fauna, mangrove, pollution

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INTRODUCTION

Biodiversity —the variety of life and the ecological processes that sustain it—serves as a sensitive barometer of ecosystem integrity and resilience. Tropical and subtropical regions, blessed with favorable temperature and moisture regimes, sustain exceptional species richness and functional complexity. India, recognized as a mega-diverse nation, still harbors a significant share of global biodiversity despite mounting pressures from rapid population growth, industrialization, and unplanned urban expansion. These forces fragment habitats, disrupt biogeochemical cycles, and erode the very

ecological services on which human well-being depends.

Ennore Creek—an estuarine arm of the Kosasthalaiyar River that connects Pulicat Lake to the Bay of Bengal—epitomizes the tension between biological wealth and escalating anthropogenic stress. Bordered by six revenue villages (Kathivakkam, Ennore, Puzhudhivakkam, Athipattu, Katupalli, and Kalanji) and flanked by ports, thermal plants, and petrochemical industries, the creek was once a mosaic of mangroves, mudflats, and salt marshes supporting productive fisheries and vital ecosystem services. Industrial effluents, dredging, and uncontrolled waste disposal have since narrowed channels, elevated contaminant loads, and fostered invasive flora, jeopardizing the system's capacity to buffer floods, sequester carbon, and sustain local livelihoods.

Against this backdrop, the present study provides a systematic appraisal of Ennore Creek's floral and faunal assemblages. By integrating standardized field surveys with secondary literature and community knowledge, we aim to (i) establish a current baseline of species composition and abundance, (ii) diagnose the principal drivers of ecological change, and (iii) recommend science-based strategies for conservation and restoration. These insights are intended to guide policymakers, industry managers, and local stakeholders in balancing economic development with stewardship of one of Tamil Nadu's most threatened estuarine ecosystems.

REVIEW OF LITERATURE

Early ichthyological surveys remain the cornerstone for understanding biodiversity trends in and around Chennai's wetlands. Daniels & Rajagopal (2004) compiled one of the first systematic fish inventories for nearby Chembarambakkam Lake, offering a baseline for comparing estuarine assemblages, while Talwar & Kacker (1984) produced the seminal national compendium of India's commercial sea fishes, widely cited in estuarine assessments.

Subsequent work has narrowed in on Ennore Creek itself. A fortnightly survey of three stations between 2018–2019 and 2022–2023 documented pronounced spatial-temporal shifts in fin- and shell-fish diversity; least-concern taxa dominated (77.6 %), whereas many shellfish remained "Not Evaluated" under IUCN criteria (Lakshmi *et al.,* 2024).

Parallel long-term analyses of waterbirds (Ramanujam *et al*., 2010; 2014) confirmed that Ennore mirrors regional estuaries in hosting high vertebrate richness yet declining specialist species.

Pollution-focused studies collectively show a worsening chemical footprint. The first comprehensive review of contaminants (Lakshmi *et al*., 2024) identified persistent industrial inputs—heavy metals, hydrocarbons and fly ash—as the creek's dominant stressors. Recent geochemical appraisals sharpen that picture: Rajendiran *et al*. (2025) reported anthropogenic enrichment of Pb, Cr, Cd and Ni in surficial sediments, using enrichment-factor and geo-accumulation indices to trace power-plant and port effluents as sources.

A separate ecological-risk assessment highlighted Cd, Pb and Cu levels exceeding international sediment-quality guidelines, flagging potential benthic toxicity.

Bio-monitoring in mangroves shows comparable trends; *Avicennia marina* tissues accumulate Pb > Zn > Cd, underscoring the species' phytoremediation potential but also its vulnerability to metal stress (Kannan *et al*., 2016).

Vegetation studies echo these chemical findings. Narasiman and Devanathan (2017) documented sharp reductions in mangrove and salt-marsh flora adjacent to the Ennore Thermal Power Station, attributing die-back to ash deposition and altered hydrodynamics. Hydrological work in the *A. marina* belt further

shows that reduced freshwater inflow and rising salinity compound pollutant stress, impairing seedling recruitment and carbon sequestration capacity.

Taken together, the literature converges on three themes: (i) historically high but now eroding biodiversity; (ii) multi-source contamination—especially heavy metals—driving ecological change; and (iii) urgent need for basin-scale restoration that couples pollutant abatement with habitat rehabilitation. Despite valuable progress, gaps persist in trophic-level toxicity studies and long-term socio-ecological monitoring, justifying the integrated assessment presented in the current study.

OBJECTIVES OF THE STUDY

The present investigation sought to generate a comprehensive, policy-relevant appraisal of Ennore Creek's biotic resources. Specifically, the study aimed to:

1. **Inventory biodiversity** – Compile a baseline list of plant and animal taxa in and around Ennore Creek by integrating standardized field surveys with published and community-derived records.
2. **Diagnose anthropogenic impacts** – Analyse spatial patterns in species composition along the tidal gradient and quantify the influence of major stressors (industrial effluents, port operations, transport corridors, waste disposal, and natural disasters) on habitat quality.
3. **Evaluate migratory-species use** – Document the presence, seasonality, and habitat requirements of migratory fauna and assess their susceptibility to ongoing environmental change.
4. **Recommend conservation actions** – Formulate evidence-based, short- and long-term restoration and management strategies to maintain or enhance the ecological integrity of Ennore Creek.

METHODOLOGY

A combined programme of field sampling and desk research was undertaken between May and August 2024. Standard transect and quadrant techniques were applied along the tidal gradient, while opportunistic observations supplemented taxa that are cryptic or patchily distributed. Local fishermen and residents provided traditional ecological knowledge that filled historical and spatial gaps in the formal record.

Flora

1. **Reconnaissance survey** – An initial walk-through mapped broad vegetation types and landscape features.
2. **Stratified ecological survey** – Representative plots were established in mangrove, salt-marsh, and terrestrial fringe habitats to record:
    - dominant growth forms and community physiognomy;
    - species occurrence and relative abundance;
    - presence of economically important, medicinal, or ecologically sensitive taxa;
    - location of any Rare, Endangered, or Threatened (RET) species, classified under IUCN criteria and the BSI Red Data Book.
3. **Secondary data collation** – Historical herbarium specimens, peer-reviewed literature, and forest-department reports were cross-checked to verify field identifications and detect long-term shifts.

Fauna

1. **Terrestrial and semi-aquatic vertebrates** – Visual Encounter Surveys (VES) and time-constrained searches were performed for reptiles, amphibians, and small mammals, with particular attention to nocturnal species.
2. **Avifauna** – Dawn and dusk point counts (10-min fixed radius) recorded all birds seen or heard; migratory status was noted.

3. **Invertebrates** – Sweep-netting, baited traps, and host-plant inspections documented butterflies and other indicator taxa.
4. **Legal status** – Each species was assigned its schedule under the Wildlife Protection Act (1972).

Aquatic Flora and Fauna

1. **Fish and crustaceans** – Cast-net samples and interviews with fishers enumerated commercially important species; catch data helped infer seasonal abundance and spawning grounds.
2. **Mollusks and macrophytes** – Quadrat sampling in intertidal and sub-tidal zones recorded benthic invertebrates and submerged vegetation.
3. **Water-quality linkage** – Site-specific measurements of salinity, pH, dissolved oxygen, and heavy-metal concentrations were correlated with species presence to diagnose pollution stress.

This multi-tiered design ensured that both conspicuous and cryptic taxa, as well as habitat-quality drivers, were adequately represented in the final biodiversity appraisal.

Assessment of Flora

The survey confirmed that Ennore Creek supports a mosaic of halophytic and terrestrial plant communities, but the composition differs strikingly between tidal and upland zones. Within the creek, mangrove vegetation is overwhelmingly dominated by Avicennia marina, a euryhaline species capable of withstanding the site's broad salinity range (Table 7; Fig. 1). In contrast, the surrounding high ground is heavily invaded by the exotic mesquite Prosopis juliflora (Figs. 1–2), which out-competes native taxa and alters soil chemistry

A total of 56 vascular plant species representing 17 families were recorded (Table 8). Growth-form analysis (Table 1) shows that trees account for the highest proportion of individuals (32.1 %), followed by herbs (30.4 %), shrubs (17.8 %), grasses (12.5 %) and climbers (7.1 %). Although the overall richness is moderate for a degraded estuary, the structural diversity remains ecologically important: trees and shrubs provide nesting substrate for birds, while the herb layer stabilises sediments along the creek margin.

Twelve medicinally valuable plants were documented (Table 2), most of them short-lived herbs such as Acalypha indica, Euphorbia hirta and Phyllanthus niruri. Their persistence indicates that pockets of relatively undisturbed substrate still exist; however, continued sediment dumping and encroachment could eliminate these populations.

Grasses (Table 3) and climbers (Table 4) are patchily distributed, largely confined to elevated levees and anthropogenic mounds where salinity is lower. The grass Typha latifolia and the climber Passiflora foetida form dense stands in partially blocked creeks and canals, signalling reduced tidal flushing. Among herbs (Table 5), several species (e.g. Tribulus terrestris, Tridax procumbens) are ruderal indicators of disturbance, whereas Salicornia europaea and Sesuvium portulacastrum testify to persistent hypersaline niches. Shrub assemblages (Table 6) include invasive Lantana camara and Jatropha spp., both linked to altered fire regimes and soil nutrient profiles.

Notably, no legally protected or IUCN-listed Threatened species were encountered; nevertheless, three taxa that are rare in Tamil Nadu—Ammannia octandra, Indigofera oblongifolia, and the seagrasses Halophila ovata and H. ovalis—were reported historically but were not detected in the present survey, suggesting local extirpation.

Some area in mangrove patches was degraded due to coal ash dumping in the creek. According to Narasimanan *et al.* 2017 there is a significant reduction of the mangrove and saline marsh species populations. Dumping of soil from outside in the mangrove habitats not only shrunk the mangrove populations but also has introduced several non-habitat and alien species, some of which are invasive. The mangrove and

salt marsh habitats have undergone severe degradation and continuation of causal factors may lead to the extinction of the critical costal ecosystem. There are no endemic and endangered species recorded from this area. However, a few species recorded from Ennore are very rare in Tamil Nadu and these include *Ammania octandra, lndigofera oblongigolia,* and two sea grasses namely *Halophila ovata, Hlaophila ovalios* have completely disappeared from the habitat. *Suaeda monoica, a saline* habitat shrub that was recorded as a mono-dominant species from Kattupalli for the Northern east coast of Tamil Nadu, is nearly eliminated except for a few scattered bushes.

Management Implications

Prosopis juliflora removal and large-scale planting of A. marina seedlings are recommended to restore tidal flats and enhance shoreline stability. Re-establishing tidal connectivity will also favour salt-marsh specialists such as Suaeda monoica, now reduced to scattered remnants. Targeted enrichment with native medicinal plants could provide dual conservation and community-health benefits, while long-term vegetation monitoring will help track the effectiveness of restoration interventions.

Assessment of Fauna

Ennore Creek remains a biologically important estuary, supporting representative assemblages from five major faunal guilds—insects, fish and other aquatic macro-fauna, herpetofauna, birds, and small mammals—even though every guild shows symptoms of stress from habitat alteration and pollution.

Butterflies (Table 8)

Seventeen species were recorded during timed-transect walks, spanning five families, of which *Phalanta phalantha, Papilio demoleus, Eurema hecabe* and *Junonia hierta* are commonly seen butterflies in the study area. Generalist taxa such as the Lime Butterfly (Papilio demoleus) and Common Grass Yellow (Eurema hecabe) dominated, while habitat specialists were scarce. The prevalence of Junonia spp. and Hypolimnas misippus—both tolerant of degraded edges—corroborates vegetation data that point to extensive disturbance. Because butterfly richness is tightly linked to host-plant diversity, continued loss of understorey herbs will further depress lepidopteran diversity unless invasive plants are controlled and native nectar sources restored.

Butterflies are categorized as keystone species, which enable them to survive many smaller species of insects and reproduce in an ecosystem. In simple terms, it denotes that conservation of butterflies, also conserves, other species of insects. In fact, the basic health of our ecosystem is directly dependent on the number of butterfly species. Butterflies act as indicators in monitoring environmental health and play an important role in food chains and food webs. Butterflies are excellent pollinators and help plants to produce fruit and seeds. Butterflies are very sensitive to pollution and have been used as bio-indicators to detect the pollution levels in the environment. Although some species of the butterflies are poisonous, many studies revealed that they are ecologically safe pesticides. Certain species are used for experiments in genetic engineering.

Butterflies, especially caterpillars and their larval forms are important sources of food for insectivorous birds. Some butterfly caterpillars are used as pests in agriculture crops. The caterpillars of some butterflies eat many harmful insects. A few species are pests because in their larval stages they can damage domestic crops or trees. Butterflies' life cycle consists of four parts, egg, larva, pupa and adult. Most species are diurnal. Butterflies have large, often brightly coloured wings, and conspicuous, fluttering flight. Other than their aesthetic value, butterflies have an important role in the forest ecosystem. Because of their diversity, wide distribution, specificity to vegetation type, rapid response to perturbation, taxonomic tractability, statistically significant abundance and ease of sampling, they have been considered useful organisms to monitor environmental changes.

Butterflies provide aesthetic appeal and are connected with all wild plants and crops at all stages of their life cycle. Few are aware of the crucial role the butterfly plays in pollination of a

large portion of economically important crops and flowering plants, which is second only to the honeybee. They pollinate about 75 percent of staple crops in the world and 80 percent of all flowering plants. The economic value of pollination is about $ 200 billion. Scientific studies have proved that the pollinators claiming an account for 12% of the value of worldwide agricultural production.

Feeding is a significant activity and food may often be the most decisive factor affecting distribution, abundance and movements of animals. In butterflies, this has a special relevance because food and mode of feeding are different in the larval and adult stages, so that the stages appear to be functionally different beings. Butterflies in their caterpillar, or larval stages need specific plants for food. Butterfly species have different types of mouthparts that are suited to specific plants. A female butterfly knows instinctively which plants are suitable to lay her eggs on. The hatched caterpillars begin eating immediately. They may spend the entire caterpillar stage of their lives on one leaf or plant, eating enough to create their cocoon and become a butterfly. Individual species within larger categories of butterflies also choose specific plants for food. Many butterflies are very specific about which host plant they will lay their eggs on. Sometimes they seek out plants in a particular family, and sometimes their caterpillars will dine on specific plants. Attractive host plant with nectar rich plant in the forest may lead to fostering one butterfly generation after the next. The extensive caterpillar damage on the host plants would not affect the forest ecosystem when compared to their positive value. Although some caterpillars are voracious garden pests, butterfly caterpillars rarely cause death or stunted growth on healthy host plants.

All butterflies are associated with plants and therefore their occurrence depends on the presence of plants. Different species of caterpillar feed on a diversity of plant species. However in a majority of species and their food preference is fundamentally the same leaves. Although most caterpillars feed on leaves, there are strict preferences for specific host plants. These strict preferences are dictated by the chemical composition of the plant parts that the caterpillars eat. Therefore, the caterpillars feeding on a particular plant species or set of species will not eat leaves of other species. India has a rich butterfly fauna comprising of 1501species out of 16, 823 species recorded from all over the world (Gaonkar, 1996).

Aquatic Fauna (Table 9; Plates 1–2)

he inventory lists nine fish, six crustacean and three mollusc species—far below historical counts for comparable Tamil-Nadu estuaries. Teleosts are skewed toward euryhaline, pollution-tolerant mullets (Mugil spp.) and cichlids (Oreochromis mossambica), while ecologically sensitive taxa (e.g. clupeids, gobies) were absent. Fisher interviews attribute the decline of once-common species such as Channa marulius to chronic effluent discharge and reduced tidal flushing. Crustacean diversity is likewise restricted to widely resilient prawns and brachyurans; the ecologically valuable mud-crab (Scylla serrata) persists but at reduced size classes, suggesting recruitment failure.

Herpetofauna (Table 10)

Herpetofauna play an important role in the food chain, and they make up a large proportion of vertebrates in certain ecosystems. Recent data indicate that herpetofauna are critical components of both terrestrial and wetland ecosystems as they play a major role in energy flow and nutrient cycling. Additionally, these taxa are excellent indicators of environmental degradation - amphibians due to their aquatic/ terrestrial life cycle and permeable skin and reptiles due to their high positioning in trophic level (Nixon, 2015). Reptiles and amphibians occupy a diverse range of habitats and microhabitats, found from deserts to grass-lands, from forests to oceans and from hills to our own houses. India is very rich in herpetofaunal diversity. There are more than 518 species of reptiles (Aengals *et al.*, 2011) and 314 species of amphibians (Dinesh *et al.*, 2011) found in India.

Amphibians and reptiles render incalculable services to agriculture and to our

ecosystem. Insects occupy first place amongst pest that damage standing crops. Majority of frogs and lizards feed on insects which are destroying the crops and forest ecosystem. Snakes have an irreplaceable role in ecology as the natural predators of rats and agricultural pests. Snakes are singularly designed and equipped to hunt for rats in their narrow subterranean burrows and hiding places in the open and in the granaries, storages etc. Similarly, those snakes which regularly feed on insects have been responsible for destroying vast number of insects which are pests in our ecosystem. These groups of animals are mostly nocturnal in nature and some of them are active round the clock. They render great service by exterminating nocturnal and diurnal insect pests from our ecosystem. The significance of amphibian and reptiles for the biosphere of our planet consequently to mankind, is so great that it is difficult to equate it with that of another group of organisms.

Studies of the abundance, diversity and habitat ecology of herpetofauna (reptiles and amphibians) are also scanty. Fragmentation and loss of natural habitats due to invasive species is the immediate threat to herpetofauna in India. Habitat loss and disintegration have direct consequences for species abundance and diversity because it reduces the available living space (Andreassen *et al*., 1998) and to affect ecological relationship between the prey -predator animal (Donovan *et al*., 1995). Hence monitoring herpetofauna population is very urgent in most parts of our country. Any data on herpetofauna, especially documenting the species is thus of both immediate and potentially broader interest because of the continued habitat loss due to development activities, intensified agricultural, plantation practices and invasion of IAS, could easily have led to species extinction before rediscovery and understanding their role in the natural ecosystem. In India the majority of herpetofauna are rare and have highly restricted distribution, a major reason for many of them being threatened and despite the high degree of endemism and threat, there have been only a few studies conducted (Ishwar *et al*., 2001). Updated information on the status, distribution, ecology and biology are very important to formulate conservation for this species. The present study was taken up to examine the species abundance and diversity of herpetofauna in and around Ennore Creek, data were collected from primary survey and secondary information collected from local villagers.

Nine species—two amphibians, five lizards/geckos, and two snakes—were confirmed through Visual Encounter Surveys, night searches and secondary information. Amphibians (Duttaphrynus melanostictus, Polypedates maculatus) were ubiquitous around freshwater seepage zones, but no mangrove-dependent frogs were detected, implying salinity stress and habitat fragmentation. Among reptiles, the Fan-throated Lizard (Sitana ponticeriana) and Keeled Grass Skink (Eutropis carinata) indicate remnant scrub patches, whereas the presence of generalist snakes (Naja naja, Ptyas mucosa) reflects a relatively intact prey base. No Schedule-I species under the Wildlife Protection Act were observed.

Avifauna (Table 11; Plates 3–4)

Birds are feathered dinosaurs. There is a fair amount of fossil-evidence supporting the theory that birds directly descended from dinosaurs. Warm-bloodedness, flight and smaller body size helped birds to adapt and diversify more than their reptilian ancestors that there are 9000 living species spread across the Earth. Around 1300 species of birds are known in India. Less than 10% of these may be commonly seen within the country.

Point counts totalled sixty-six bird species, mixing resident insectivores (e.g. Black Drongo Dicrurus adsimilis), wetland specialists (e.g. Black-winged Stilt Himantopus himantopus), and winter migrants such as Curlew Sandpiper (Calidris ferruginea). *Acridotheres tristis*, *Corvus splendens*, *Dicrurus adsimilis*, *Vanellus indicus* and *Turdoides affinis* are commonly seen birds in the study area. The globally Near-Threatened Spot-billed Pelican (Pelecanus philippensis) and Painted Stork (Mycteria leucocephala) underscore the creek's regional significance as a foraging ground. However, large flocks of Greater Flamingo (Phoenicopterus ruber) reported historically were not observed, lending weight to

local accounts of declining water quality and food resources.

Mammals (Table 12)

Mammals are warm-blooded vertebrate animals. They are characterized by their ability to lactate while nurturing babies. Mammals are geographically as widespread as birds, particularly inhabiting the Earth from pole. Of the 5000 species of mammal known worldwide, at least 400 exist in India.

As per our field observations and interactions with local personnel including fisher man reveals that there are no major wildlife reported in study area due to development of industries. There are several minor carnivores and herbivores present in the study area.

Eight small to medium terrestrial mammals were identified, all common edge or commensal species (e.g. Indian Hare Lepus nigricollis, Golden Jackal Canis aureus). The near-absence of semi-aquatic mammals such as otters points to habitat simplification and depleted fish stocks. All species recorded fall under the least restrictive WPA schedules, yet increasing road density and night-time traffic pose mounting threats.

Synthesis and Management Priorities

Across guilds, three stressors recur: (i) industrial effluents that suppress sensitive fish and benthos; (ii) invasive vegetation (Prosopis juliflora, Lantana camara) that reduces floral heterogeneity and, by extension, butterfly and bird resources; and (iii) habitat fragmentation that isolates herpetofaunal and avian sub-populations. Immediate measures should therefore couple pollutant abatement with invasive-species removal, mangrove enrichment, and creation of undisturbed roosting islands. Long-term faunal monitoring using the present species lists as a baseline will be essential for evaluating restoration success and adapting management actions.

Eco-Restoration

Restoring Ennore Creek demands an integrated approach that marries ecology, engineering and socio-economics. Three complementary objectives guide the programme:

1. **Remove or mitigate stressors** – Curtail industrial effluents, excavate illegal fill, and dismantle derelict bunds to re-establish natural tidal exchange.
2. **Rebuild native plant communities** – Re-establish mangrove and salt-marsh mosaics, prioritising *Avicennia marina* for its broad salinity tolerance and sediment-binding capacity. Invasive stands of *Prosopis juliflora* and *Lantana camara* should be eradicated through phased mechanical removal and targeted herbicide application, followed by enrichment planting with nursery-raised mangrove propagules and salt-marsh herbs.
3. **Enhance landscape aesthetics and public access** – Design boardwalks, bird-watching hides and interpretive signage that channel visitors away from sensitive habitats while promoting community stewardship.

Drawing on principles from restoration ecology, landscape ecology and ecological planning, the following structural interventions are proposed:

- **Hydrodynamic rebalancing** – Install low-crested submerged dikes to moderate wave energy and retain fine sediments; construct vegetated ecological embankments that incorporate gentle slopes, coir-log toe protection and mangrove fringe planting.
- **Selective dredging** – Remove fly-ash and silt accretions that choke primary channels, ensuring spoil is disposed of at lined upland sites or reused as substrate for mangrove islands.
- **Re-vegetation of planting islands** – Field mapping (Fig. 2) identifies three depositional islands (total 6 343 m²; Island 1 = 1 467 m², Island 2 = 3 462 m², Island 3

= 1 414 m²). A phased schedule (Table 13) calls for c. 6 300 *A. marina* propagules, spaced at 1 × 1 m, preceded by soil desalination (if conductivity > 35 mS cm⁻¹) and mulch-mat installation to suppress weeds.

Long-term success hinges on adaptive management: quarterly water-quality audits, annual vegetation and faunal monitoring, and a participatory governance model that involves local fishers, port authorities and municipal planners. By coupling pollutant abatement with habitat reconstruction and community outreach, Ennore Creek can regain its role as a biodiverse, climate-resilient estuarine corridor.

Area Available for Plantation in Ennore Creek

A preliminary geomorphic survey delineated **three depositional islands** within the central reach of Ennore Creek that are suitable for mangrove enrichment planting (Fig. 2). Together, the islets provide **6 343 m²** of plantable surface, distributed as follows:

Island	Approximate Area (m²)	Notes on Site Condition
1	**1 467**	Sheltered by natural levees; moderate silt overlay; salinity 24–28 ppt
2	**3 462**	Largest platform; partially infilled with fly-ash slurry; salinity 26–32 ppt
3	**1 414**	Narrow, elongate bar; subject to periodic overtopping during spring tides

Sub-surface conductivity profiles confirm that all three islands fall within the salinity tolerance of *Avicennia marina* (≤ 35 ppt). Mechanical clearance of **Prosopis juliflora** thickets will precede planting to reduce competition and facilitate establishment of nursery-raised mangrove propagules. Access canals will be reopened where silted to ensure adequate tidal inundation and nutrient exchange.

Based on the **1 m × 1 m** spacing recommended for early successional mangrove stands, the combined area can accommodate ≈ **6 300 propagules**, as costed in Table 13. Post-planting maintenance will include quarterly survival checks, infill planting, and opportunistic removal of new mesquite recruits.

This spatial appraisal provides the logistical foundation for phased restoration, enabling managers to align propagule production, labour mobilisation and monitoring schedules with the creek's hydrodynamic regime.

Figures and Tables



Figure 1. A View of Ennore Creek with Mangrove Vegetation



Fig.1, 2: ***Prosopis juliflora,***
Fig.3,4. ***Pithecellobium dulce,***
Fig.5. ***Tamarindus indica,***
Fig.6. ***Leucaena leucocephala.***
Fig.7. ***Azadirachta indica.***
Fig.8. ***Thespesia populnea***

Vegetation Type	Observed Abundance	% of Abundance
Grass	7	12.50
Climber	4	7.14
Herbs	17	30.36
Shrubs	10	17.86
Trees	18	32.14

Table.1. Vegetation types recorded across the Ennore Creek

S.No	Common Name	Scientific Name	Vegetation Type
1	Indian Copper leaf	Acalypha indica	Herbs
2	Snakeweed	Euphorbia hirta	Herbs
3	Keezhanelli	Phyllanthus niruri	Herbs
4	Common wire Weed	Sida acuta	Herbs
5	Flannel Weed	Sida cordifolia	Herbs
6	Prickly Chaff Flower	Achyranthes aspera	Herbs
7	Puncture vine	Tribulus terrestris	Herbs
8	Asian spider flower	Cleome viscose	Herbs
9	Thumbai	*Leucas aspera*	Herbs
10	Jimson Weed	Datura metel	Shrub
11	Avarm Senna	Senna auriculata	Shrub
12	Neem	Azadirachta indica	Tree

Table.2. Medicinal plants recorded around the Ennore Creek

S. No	Family	Species Name	Common Name
1	Poaceae	*Cynodon dactylon*	Indian *doab*
2	Poaceae	*Typha latifolia*	Sumbu
3	Poaceae	*Heteropogon cantortus*	*Black spear grass*
4	Poaceae	*Rhynchetytrum repens*	*Natal grass*
5	Poaceae	*Dactyloctenium aegyptium*	*Crowfoot Grass*
6	Poaceae	*Eragrostis viscosa*	Sand Grass
7	Poaceae	*Chloris barbata*	Purple Finger Grass

Table.3. List of Grass recorded along the Creek

S.No	Family	Species Name	Common Name
1	Passifloraceae	*Passiflora foetida*	Passion flower
2	Convolvulaceae	*Ipomoea carnea*	Pink morning glory
3	Cucurbitaceae	*Cucumis anguria*	Maroon cucumber
4	Cucurbitaceae	*Cucumis maderaspatanus*	Madras pea pumpkin

Table.4. List of climbers recorded along the Creek

S.No	Family	Species Name	Common Name
1	Passifloraceae	*Turnera subulata*	White alder
2	Euphorbiceae	*Acalypha indica*	Indian Copperleaf
3	Euphorbiceae	*Euphorbia hirta*	Snakeweed
4	Phyllanthaceae	*Phyllanthus niruri*	Keezhanelli
5	Euphorbiceae	*Croton bonplandianum*	Ban tulsi
6	Malvaceae	*Sida acuta*	Common wire weed
7	Malvaceae	*Sida cordifolia*	Flannel weed
8	Amaranthaceae	*Achyranthes aspera*	Prickly Chaff Flower
9	Zygophyllaceae	*Tribulus terrestris*	Puncture vine
10	Acanthaceae	*Ruellia tuberosa*	Minnie root
11	Fabaceae	*Tephrosia purpurea*	Wild Indigo
12	Fabaceae	*Rhynchosia aurea*	Golden-Flowered Snoutbean
13	Fabaceae	*Indigofera linnaei*	Sheppunerunji
14	Cleomaceae	*Cleome viscosa*	Asian spider flower
15	Phyllanthaceae	*Phyllanthus virgatus*	Seed under leaf
16	Phyllanthaceae	*Phyllanthus maderaspatensis*	Madras Ground Gooseberry
17	Lamiaceae	*Leucas aspera*	Thumbai

Table.5. List of Herbs recorded along the creek

S. No	Family	Species Name	Common Name
1	Solanaceae	*Datura metel*	Jimson weed
2	Apocynaceae	*Calotropis gigantea*	Crown flower
3	Euphorbiaceae	*Jatropha gossypifolia*	Cottonleaf physic nut
4	Euphorbiaceae	*Jatropha curcas*	Physic nut
5	Caesalpiniaceae	*Senna auriculata*	Avarm Senna
6	Caesalpiniaceae	*Senna alata*	Candle bush
7	Caesalpiniaceae	*Cassia hirsuta*	Silky Cassia
8	Verbenaceae	*Lantana camara*	Spanish flag
9	Malvaceae	*Abutilon indicum*	Indian Mallow
10	Phyllanthaceae	*Phyllanthus reticulatus*	Black Gooseberry

Table.6. List of Shrubs recorded along the creek

S.No	Family	Species Name	Common Name
1	Malvaceae	*Thespesia populnea*	Indian tulip tree
2	Meliaceae	*Azadirachta indica*	Neem
3	Rhamnaceae	*Ziziphus mauritiana*	Indian plum
4	Fabaceae	*Pongamia pinnata*	Indian Beech tree
5	Fabaceae	*Tamarindus indica*	Tamarind
6	Fabaceae	*Pithecellobium dulce*	Madras thorn
7	Mimosaceae	*Prosopis juliflora*	The Mesquite
8	Fabaceae	*Acacia planifrons*	The Umbrella Thorn
9	Fabaceae	*Leucaena leucocephala*	Sababul
10	Anacardiaceae	*Lannea coromandelica*	Indian Ash Tree
11	Fabaceae	*Delonix regia*	Gulmohar
12	Fabaceae	*Peltophorum pterocarpum*	Copperpod
13	Rubiaceae	*Morinda pubescens*	Morinda tree
14	Moraceae	*Ficus religiosa*	Peepal tree
15	Moraceae	*Ficus benghalensis*	Banyan tree
16	Arecaceae	*Borassus flabellifer*	Palmyra palm
17	Arecaceae	*Phoenix loureirii*	Wild date palm
18	Acanthaceae	*Avicennia marina*	Indian Mangrove

Table.7.List of tree species and Mangrove recorded along the Buckingham Canal to Ennore creek

Table.8. Overall List of flora recorded in and around Ennore Creeck

S.No	Common Name	Scientific Name	Vegetation Type
1	Passion flower	*Passiflora foetida*	Climbers
2	Pink morning glory	*Ipomoea carnea*	Climbers
3	Maroon cucumber	*Cucumis anguria*	Climbers
4	Madras pea pumpkin	*Cucumis maderaspatanus*	Climbers
5	Indian *doab*	*Cynodon dactylon*	Grass
6	Sumbu	*Typha latifolia*	Grass
7	*Black spear grass*	*Heteropogon cantortus*	Grass
8	*Natal grass*	*Rhynchetytrum repens*	Grass
9	*Crowfoot Grass*	*Dactyloctenium aegyptium*	Grass
10	Sand Grass	*Eragrostis viscosa*	Grass
11	Purple Finger Grass	*Chloris barbata*	Grass
12	Button Sedge	*Fimbrisytlis argentea*	Grass
13	Umbrella Sedge	*Cyperus exaltatus*	Grass
14	Common Sedge	*Cyperus disans*	Grass
15	Wild Sugarcane	*Saccharum spontaneum*	Grass
16	Rusty Sedge	*Fimbristylis ferruginea*	Grass
17	Indian Copper leaf	*Acalypha indica*	Herbs
18	Snakeweed	*Euphorbia hirta*	Herbs
19	Keezhanelli	*Phyllanthus niruri*	Herbs
20	Common wire Weed	*Sida acuta*	Herbs
21	Pickle Grass	*Salicornia europaea*	Herbs
22	Flannel Weed	*Sida cordifolia*	Herbs
23	Prickly Chaff Flower	*Achyranthes aspera*	Herbs
24	Puncture vine	*Tribulus terrestris*	Herbs
25	Asian spider flower	*Cleome viscose*	Herbs
26	Scabies plan	*Lepidagathis crisata*	Herbs
27	Thumbai	*Leucas aspera*	Herbs
28	Mercurry plant	*Micrococca mercurialis*	Herbs
29	Fragran Wayside Shrub	*Hyptis suaveolens*	Herbs
30	Marsh Blue	*Hydroles zeylanica*	Herbs
31	Para Indigo	*Indigofera linnaei*	Herbs
32	Scorpion Tail	*Heliotropium indicum*	Herbs
33	Top Flower	*Tridax procumbens*	Herbs
34	Jimson Weed	*Datura metel*	Herbs

35	Prickly Amaranth	*Amaranthus spinosus*	Herbs
36	White alder	*Turnera subulata*	Herbs
37	Ban tulsi	*Croton bonplandianum*	Herbs
38	Madras Ground Gooseberry	*Phyllanthus maderaspatensis*	Herbs
39	Minnie root	*Ruellia tuberosa*	Herbs
40	Wild Indigo	*Tephrosia purpurea*	Herbs
41	Golden-Flowered Snoutbean	*Rhynchosia aurea*	Herbs
42	Sheppunerunji	*Indigofera linnaei*	Herbs
43	Seed under leaf	*Phyllanthus virgatus*	Herbs
44	Wild Jut	*Corchorus trilocularis*	Herbs
45	Giant Pigweed	*Trianthema portulacastrum*	Herbs
46	Ceylon Swamp Mallow	*Pavonia zeylanica*	Herbs
47	shoreline purslane	*Sesuvium portulacastrum*	Herbs
48	Afro-Asian Horse-Purslane	*Trianthema triquetra*	Herbs
49	Crown flower	*Calotropis gigantea*	Shrub
50	Cottonleaf physic nut	*Jatropha gossypifolia*	Shrub
51	Physic nut	*Jatropha curcas*	Shrub
52	Avarm Senna	*Senna auriculata*	Shrub
53	Candle bush	*Senna alata*	Shrub
54	Silky Cassia	*Cassia hirsuta*	Shrub
55	Spanish flag	*Lantana camara*	Shrub
56	*Indian Mallow*	*Abutilon indicum*	Shrub
57	*Black Gooseberry*	*Phyllanthus reticulatus*	Shrub
58	Amanakku	*Ricinus communis*	Shrub
59	Indian tulip tree	*Thespesia populnea*	Trees
60	Neem	*Azadirachta indica*	Trees
61	Indian plum	*Ziziphus mauritiana*	Trees
62	Indian Beech tree	*Pongamia pinnata*	Trees
63	Tamarind	*Tamarindus indica*	Trees
64	Madras thorn	*Pithecellobium dulce*	Trees
65	The Mesquite	*Prosopis juliflora*	Trees
66	The Umbrella Thorn	*Acacia planifrons*	Trees
67	Sababul	*Leucaena leucocephala*	Trees
68	Indian Ash Tree	*Lannea coromandelica*	Trees
69	Gulmohar	*Delonix regia*	Trees
70	Copperpod	*Peltophorum pterocarpum*	Trees
71	Morinda tree	*Morinda pubescens*	Trees
72	Peepal tree	*Ficus religiosa*	Trees
73	Banyan tree	*Ficus benghalensis*	Trees

74	Palmyra palm	*Borassus flabellifer*	Trees
75	Wild date palm	*Phoenix loureirii*	Trees
76	Indian Mangrove	*Avicennia marina*	Trees

Table.8. List butterflies recorded during the study period in and around Ennore creek

S.No	Common Name	Scientific Name
1	Lime Butterfly	*Papilio demoleus*
2	Common Emigrant	*Catopsiliapomona*
3	Common Gull	*Cepora nerissa*
4	Common Grass Yellow	*Eurema hecabe*
5	Psyche	*Leptosia nina*
6	Common Evening Brown	*Melanitis ismene*
7	Tawny Coster	*Acraea violae*
8	Common Leopard	*Phalanta phalantha*
9	Common Caster	*Ariadne merione*
10	Danaid Egg Fly	*Hypolimnas misippus*
11	Yellow Pansy	*Junonia hierta*
12	Blue Pansy	*Junonia orithya*
13	Lemon Pansy	*Junonia lemonias*
14	Peacock Pansy	*Junonia almanac*
15	Grey Pansy	*Junonia atlites*
16	Chocolate Pansy	*Junonia iphita*
17	Common Indian Crow	*Euploea core*

Table.9. Aquatic fauna found in the study area

S.No	Name of the Species	Scientific Name
1	White Mullet	*Mugil curema*
2	Tilapia	*Oreochromis mossambica*
3	Chinese pomfret	*Pampus chillellsis*
4	Speigler ·s grey mullet	*Valanwgil speileri*
5	Long-snouted barb	*Puntius dorsalis*
6	Striped dwarf catfish	*Mystius gulio*
7	Faughn's mackerel	*Rastrelliger jaughni*

8	Spot-fin barb	*Puntius sophore*
9	Giant snake head	*Channa marulius*
Crustaceans		
1	Prawn	*Peneaus indicus*
2	Fresh Water Prawn	*Macrobrachium rosenburgii*
3	Tiger Prawn	*Peneaus monodon*
4	Pond Crab	*Paratelphusa Sp.*
5	Fiddler Crabs	*Uca pugnax*
6	Mud crab	*Scylla serrata*
Mollusk		
1	Oyster	*Crassostrea spp.*
2	Apple snail	*Pyla virens*
3	Edible snail	*Helix pomatia*

Table.10. List of herpetofauna recorded in the study area

S.No	Common Name	Species Name
1	Common Indian Toad	*Duttaphrynus melanostictus*
2	Indian Tree Frog	*Polypedates maculates*
3	Common Garden Lizard	*Calotes versicolor*
4	Common Keeled Grass skink	*Eutrophis carinata*
5	Fan Throated Lizard	*Sitana ponticeriana*
6	Bark Gecko	*Hemidactylus leschenaultii*
7	Spectacled cobra	*Naja naja*
8	Rat Snake	*Ptyas mucosa*
9	Common krait	*Bungarus caeruleus*

Table.11. List of Birds Recorded During the study Period in and around the Ennore creek

S. No.	Common Name	Scientific Name
1	Common Tailorbird	*Orthotomus sutorius*
2	Purple-rumped Sunbird	*Nectarinia zeylonica*
3	Long Billed Sunbird	*Nectarinia lotenia*
4	House Sparrow	*Passer domesticus*
5	Yellowbilled Babbler	*Turdoides affinis*
6	Redvented Bulbul	*Pycnonotus cafer*
7	House Crow	*Corvus splendens*
8	Large billed Crow	*Corvus macrorhynchos*
9	Common Myna	*Acridotheres tristis*
10	Black-headed Myna	*Sturnus pagodarum*
11	Black Drongo	*Dicrurus adsimilis*
12	Eurasian Hoopoe	*Upupa epops*
13	Little Green Bee-eater	*Merops orientalis*
14	White throated Kingfisher	*Halcyon smyrnensis*
15	Pied Kingfisher	*Ceryle rudis*
16	Asian Koel	*Eudynamys scolopacea*
17	Small Blue Kingfisher	*Alcedo atthis*
18	Rock Pigeon	*Columba livia*
19	Redwattled Lapwing	*Vanellus indicus*
20	Indian Pond Heron	*Ardeola grayii*
21	Brahminy Kite	*Haliastur Indus*
22	Cattle Egret	*Babulcus ibis*
23	Black Kite	*Milvus migrans*
24	Spot-billed pelican	*Pelecanus philippensis*
25	White-breasted Water-hen	*Amaurornis phoenicurus*
26	Spot-billed Duck	*Anas poecilorhyncha*

27	Painted Stork	*Mycteria leucocephala*
28	Eurasian Coot	*Fulica atra*
29	Grey Heron	*Ardea cinerea*
31	Little Cormorant	*Phalacrocorax fuscicollis*
32	Paradise Flycatcher	*Terpsiphone paradise*
33	Indian Robin	*Copsychus saularis*
34	Oriental Magpie Robin	*Copsychus saularis*
35	Greater Flamingo	*Phoenicoperus ruber*
36	Common Ringed Plover	*Charadrius hiaticula*
37	Grey Francolin	*Francolinus pondicerianus*
38	Asian Openbill-Sork	*Anasfomus oscitana*
39	Spotted Munia	*Lonchura punctulats*
40	Large Pied Wagtail	*Motacilla mederaspatensis*
41	Spotted Owlet	*Athene brama*
42	Greater Coucal	*Centropus sinensis*
43	Blue Rock Pigeon	*Straptopelia chinensis*
44	Curlew sandpiper	*Calidris ferruginea*
45	Little Stint	*Calidris minuta*
46	Large Egret	*Casmero diusalbus*
47	Black tailed godwit	*Limosa limosa*
48	Grey Plover	*Pluvialis squatarola*
49	Little Tern	*Sternula albifrons*
50	Oriental Skylark	*Alauda guigula*
51	Painted Snipe	*Rostratulaben ghalensis*
52	Spotted Dove	*Spilopelia chinensis*
53	Ringed Dove	*Streptopelia capicola*
54	Purple Heron	Ardea purpurea
55	Black-winged Silt	*Himantopus himantopus*
56	Paddy field pipit	*Anthus rufulus*
57	Black bittern	*Ixobrychus flavicollis*

58	Common Sandpiper	*Tringa hypoleucos*
59	Indian roller	*Coricias bengalensis*
60	Palm swift	*Cypsiurus batasiensis*
61	Pied bush chat	*Saxicola caprata*
62	Indian river tern	*Sterna aurantia*
63	Grey shrike	*Lanius excubitor*
64	House swift	*Apus affinis*
65	Spotted sandpiper	*Tringa glareola*
66	Black-winged kite	*Haliastur Indus*

Table.12. List of Mammals found in the Study Area during the study period

S.No	Common Name	Scientific Name
1	*Black napped Hare	*Lapus nigricollis*
2	Three striped Palm Squirrel	*Funumbuls palmarum*
3	Common Mongoose	Herpestes edwardsii
4	*Golden Jackal	*Canis aureus*
5	Common Mouse	*Mus musculus*
6	Lesser Bandicoot	*Bandicota bengalensis*
7	Greater Bandicoot	*Bandicota indica*
8	House rat	*Rattus rattus*

*secondary information.

Plate.1. Some aquatic animals recorded during the survey in Ennore Creek

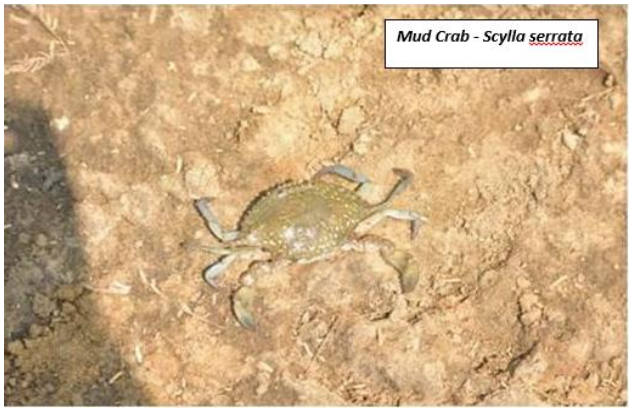












Some birds observed in Ennore Creek during the study period



Large Egret



Little Cormorant



Spot Billed Pelican



Black Winged Stilt



Common Sandpiper



Indian Pond Heron



Greater Flamingo and Intermediate Egret



Grey Heron



Redwattled Lapwing



Grey Francolin



Little-green Bee-eater



Yellow-billed Babbler



Fig.2. Survey sketch for proposed plantation area

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