

சூழல் அறிவோம்

சுற்றுச்சூழல் கல்வி, பாதுகாப்பு மற்றும் விழிப்புணர்வு இயக்கம்

Reg. No. BK-4/9/2025, Tamil Nadu, India

KOVALAM-NEMMELI COASTAL WETLAND COMPLEX

Species Nursery Documentation – Conservation Report

focusing on the Muthukadu Estuary

Finfish & Shellfish Species Nursing Their Young: Ecological Analysis, Reservoir Threat Assessment & Scientific References

Southeast Coast of India | Chengalpet District, Tamil Nadu | April 2026

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⚠ NOTICE: This Document Serves a Dual Purpose

This report presents scientific documentation of the species nursery value of the Muthukadu Estuary and the Kovalam-Nemmelī coastal wetland complex. It simultaneously serves as conservation evidence against the proposed Mamallan Reservoir (commenced January 2026), which will irreversibly destroy the brackish estuarine ecosystem documented herein. The evidence presented constitutes grounds for an immediate stay of construction, a Comprehensive EIA review, and formal protected status for the Nemmelī-Muthukadu complex. This report is a companion document to the Suzhal Arivom Conservation Report on Nemmelī Coastal Wetland Complex (April 2026) [Ref: E-I].

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1. Overview of Findings

The Muthukadu estuary and Kelambakkam backwaters, forming part of the Kovalam-Nemmelī coastal wetland complex located approximately 35-40 km south of Chennai along the southeast coast of Tamil Nadu (12.80N, 80.24E), represent a critically important estuarine nursery habitat along the Bay of Bengal coastline. [Ref: A-III] The brackish water lagoon, separated from the open sea by a seasonally dynamic sandbar, creates a sheltered, nutrient-rich environment that supports an exceptional diversity of commercially and ecologically important marine, brackish-water, and estuarine species during their juvenile and nursing phases. [Ref: A-I]

Field observations have documented 13 species actively nursing their young, comprising 8 finfish species and 5 shellfish species. This includes five families that use the estuary exclusively as a juvenile nursery ground (Lutjanidae, Monodactylidae, Scatophagidae, Mugilidae, and Penaeidae) before migrating to

offshore habitats as adults. [Ref: A-IV] The site is identified and prioritised as an Important Marine and Coastal Biodiversity Area (ICMBA) by the Wildlife Institute of India, one of 107 such sites nationally. [Ref: A-III, B-I, B-II]

⚠ The Mamallan Reservoir Threat: January 2026

The Tamil Nadu Government commenced construction of the Mamallan Reservoir in January 2026, proposing to impound the Nemmeli coastal wetland (of which the Muthukadu estuary is the northern gateway) into a 170 MLD freshwater reservoir across 4,375 acres in Phase I (total wetland area: 8,408 acres). Every species documented in this report is either euryhaline (dependent on salinity fluctuation) or an obligate estuarine nursery user. The salinity gradient ranging from 0 to 35 ppt seasonally is not merely a feature of this habitat; it is the habitat itself. The reservoir does not alter the ecosystem. It eliminates it.

The eDNA metagenomics study conducted at Muttukadu [Ref: A-I] documented 156 eukaryote species from 21 phyla, a biodiversity richness that depends entirely on the brackish hydrological regime the reservoir project would permanently destroy.

1.1 Ecological Importance: with Reservoir Impact Assessment

The Kovalam-Nemmel estuarine system functions as a critical ecological nexus. Each function below is followed by the specific reservoir impact.

Nursery Ground: The sheltered brackish waters provide safe juvenile-rearing habitat for *Lates calcarifer*, *Mugil cephalus*, *Chanos chanos*, and *Lutjanus argentimaculatus*. [Ref: A-VIII] **Reservoir Impact:** Freshwater impoundment eliminates the salinity gradient that triggers juvenile recruitment from the sea. All 8 finfish species lose their only local nursery ground.

Fisheries Base: Local artisanal fishers depend on seed collection of *Scylla serrata*, *Penaeus monodon*, and *P. indicus*. [Ref: A-II, A-XIII] **Reservoir Impact:** Conversion to freshwater eliminates wild seedstock. Thousands of fishing households and over 3,000 shrimp farms lose access to naturally recruited wild seed.

Biodiversity Hotspot: The salinity gradient (0-35 ppt seasonal) supports both marine-origin species and endemic south Indian species simultaneously. [Ref: A-IV, A-XII] **Reservoir Impact:** This gradient becomes permanent 0 ppt freshwater. Both endemic cichlid species lose their only documented Chennai-region breeding habitat.

Trophic Web Support: Marine diatom communities (*Coscinodiscus granii* at 1.2×10^6 cells/L) fuel the food web supporting milkfish, mullets, and predators. [Ref: A-X] **Reservoir Impact:** Marine diatoms cannot survive freshwater impoundment. The entire bottom-up trophic cascade collapses from the primary producer level upward.

Climate Buffer: The estuary's mangrove fringes and salt marshes protect the Kelambakkam-OMR corridor from storm surges. [Ref: A-III] **Reservoir Impact:** Raising 4.5-metre bunds severs tidal connectivity to the mangrove fringe, destroying its storm surge absorption function and increasing coastal vulnerability.

Conservation Concern: Pollution from sewage discharge and microplastic contamination already pose threats to juvenile fish survival. [Ref: A-XX] **Reservoir Impact:** The reservoir adds an irreversible threat. Unlike pollution which can be remediated, freshwater conversion is permanent and total destruction of the estuarine ecosystem.

1.2 Summary of Documented Species

A total of 13 species nursing their young have been documented across two groups:

- **Finfish** (8 species): *Lates calcarifer*, *Mugil cephalus*, *Chanos chanos*, *Lutjanus argentimaculatus*, *Etroplus suratensis*, *Pseudetroplus maculatus*, *Scatophagus argus*, *Monodactylus argenteus* [Ref: A-IV to A-XIV]
- **Shellfish** (5 species): *Scylla serrata*, *Scylla olivacea*, *Penaeus monodon*, *Penaeus vannamei*, *Penaeus indicus* [Ref: A-II, A-XI, A-XIII, A-XVII, A-XIX, A-XXIII]

Critical Finding: No Species Can Survive Reservoir Conversion

Each of the 13 species documented here is either euryhaline (dependent on salinity fluctuation) or an obligate estuarine nursery user. Not one of them can survive, recruit, or reproduce in a static freshwater impoundment. The proposed reservoir does not merely alter the habitat; it eliminates the ecological conditions that define it. Additionally, 12 supporting species documented in regional papers from analogous Tamil Nadu estuarine systems are included in Section 3, all sharing this same fundamental vulnerability.

2. The Mamallan Reservoir: A Species-by-Species Assessment of Destruction

The table below assesses precisely how reservoir conversion will destroy the nursery function of the Muthukadu estuary for each of the 13 documented species. This constitutes the scientific spine of the opposition to the project.

Scientific Name	Common Name	Group	Nursery Dependency	Reservoir Impact
<i>Lates calcarifer</i>	Asian Seabass	Finfish	Catadromous: larvae from offshore recruit into brackish backwaters using salinity gradient as cue	Freshwater impoundment eliminates salinity cue; juvenile recruitment collapses; seabass fishery across Chengalpattu ends
<i>Mugil cephalus</i>	Flathead Grey Mullet	Finfish	Euryhaline: juveniles school in backwaters; spawning cued to salinity cycle (Jan-Feb peak)	Freshwater disrupts salinity-cued spawning; mudflat biofilm food source destroyed; mullet fishery ends
<i>Chanos chanos</i>	Milkfish	Finfish	Filter-feeder; dependent on brackish planktonic productivity (<i>Coscinodiscus granii</i> at 1.2×10^6 cells/L)	Marine diatom communities cannot survive freshwater; trophic base collapses; milkfish recruitment ceases
<i>Lutjanus argentimaculatus</i>	Mangrove Red Snapper	Finfish	Obligate estuarine nursery: juveniles found exclusively in mangrove tidal creeks	Loss of tidal flushing severs estuarine-reef connectivity; only local nursery permanently destroyed
<i>Etroplus suratensis</i>	Pearlscale / Green Chromide	Finfish (Endemic)	Endemic south Indian cichlid; two spawning peaks aligned to monsoon-driven salinity cycles	Freshwater impoundment eliminates both spawning cycles; only Chennai-region breeding habitat lost

Scientific Name	Common Name	Group	Nursery Dependency	Reservoir Impact
<i>Pseudotroplus maculatus</i>	Orange Chromide	Finfish (Endemic)	Brackish estuarine fringe specialist; requires moderate salinity and natural substrate	Embankment destroys substrate; salinity removal makes habitat biologically unsuitable for second endemic
<i>Scatophagus argus</i>	Spotted Scat	Finfish	Fry recruited from Bay of Bengal; salinity gradient drives estuarine recruitment in spring-summer	Impoundment blocks marine fry ingress; recruitment pathway permanently severed
<i>Monodactylus argenteus</i>	Silver Moony	Finfish	Classic estuarine indicator; schools near mangrove prop roots; dependent on tidal connectivity	Raised bunds eliminate tidal connectivity; habitat structurally destroyed; cannot colonise freshwater
<i>Scylla serrata</i>	Giant Mud Crab	Shellfish	Megalopa settle in intertidal mangrove zones with tidal flushing; wild seedstock collected locally	Tidal flushing eliminated; seedstock collection collapses; Chengalpet crab aquaculture loses wild seed
<i>Scylla olivacea</i>	Orange Mud Crab	Shellfish	Mangrove-estuarine specialist; RGCA hatchery depends on wild Chengalpet coast seedstock	Habitat made permanently unsuitable; RGCA government hatchery seedstock supply ends
<i>Penaeus monodon</i>	Giant Tiger Prawn	Shellfish	Post-larvae recruit from offshore into estuarine nursery; flagship of TN aquaculture (3,000+ farms)	PL recruitment pathway severed; over 3,000 registered shrimp farms lose wild seed from this zone
<i>Penaeus vannamei</i>	Pacific White Shrimp	Shellfish	Cultured in ponds drawing brackish estuarine water; hatcheries near Kelambakkam depend on estuary	Estuary water becomes freshwater; pond intake ecologically incompatible; coastal aquaculture collapses
<i>Penaeus indicus</i>	Indian White Prawn	Shellfish	Native prawn; juveniles use shallow mudflats and seagrass beds as nursery grounds	Mudflat ecosystem permanently destroyed; native prawn nursery eliminated from this coastal stretch

The cumulative picture is unambiguous: the Mamallan Reservoir project would result in the functional biological extinction of the estuarine nursery at Muthukadu. No ecological mitigation can replicate a tidal salinity gradient. The loss is permanent and irreversible.

3. Extended Species Table: Supporting Regional Documentation

The following 12 species are documented in regional papers from analogous Tamil Nadu estuarine systems and are strongly corroborated as likely residents or regular users of the Kovalam-Nemmeli complex. All share the same fundamental vulnerability to freshwater conversion.

Scientific Name	Common Name	Group	Habitat Type	Regional Documentation Notes
<i>Eleutheronema tetradactylum</i>	Fourfinger Threadfin	Finfish	Estuarine-coastal	2nd most abundant at Muttukadu (4%); high commercial value; juvenile nursery user
<i>Oreochromis mossambicus</i>	Mozambique Tilapia	Finfish	Euryhaline	Tolerates brackish water; documented in adjacent Tamil Nadu estuaries
<i>Gerres filamentosus</i>	Whipfin Silver-biddy	Finfish	Estuarine	Common in mudflat-adjacent estuaries; feeds on benthic invertebrates
<i>Valamugil cunnesius</i>	Longarm Mullet	Finfish	Euryhaline	Co-occurs with <i>Mugil cephalus</i> in Tamil Nadu backwaters
<i>Ambassis commersoni</i>	Commerson's Glassy Perchlet	Finfish	Brackish	Common indicator of healthy brackish estuarine fringe habitats
Hilsa kelee	Kelee Shad	Finfish	Anadromous	Uses estuarine transition zones; documented in analogous TN estuaries
<i>Thryssa malabarica</i>	Malabar Thryssa	Finfish	Estuarine-coastal	Engraulid; estuarine nursery user in southeast India
<i>Metapenaeus monoceros</i>	Speckled Shrimp	Shellfish	Estuarine	Common in TN estuarine fisheries; juveniles use shallow mudflats
<i>Metapenaeus dobsoni</i>	Kadal Shrimp	Shellfish	Estuarine	Important artisanal fishery species; estuarine nursery dependent
<i>Portunus pelagicus</i>	Blue Swimming Crab	Shellfish	Estuarine-coastal	Juveniles use estuarine nursery areas; valued commercial species
<i>Perna viridis</i>	Green Mussel	Shellfish/Bivalve	Brackish-marine	Documented in Tamil Nadu estuaries; filter-feeder integral to trophic web
<i>Villorita cyprinoides</i>	Black Clam	Shellfish/Bivalve	Brackish	Endemic; supports local clam harvesting communities; salinity-dependent

4. Species Ecological Notes with Reservoir Impact

Lates calcarifer (Asian Seabass) | Finfish | Diadromous

Asian seabass is a catadromous euryhaline predator that spawns in offshore marine waters. Larvae and juveniles migrate into estuaries and backwaters, where they use the rich invertebrate and small-fish assemblages as food. [Ref: A-VIII] At Kelambakkam, juveniles use the mangrove-fringed creeks and shallow tidal flats as nursery grounds. Adults can reach 200 cm and 60 kg. [Ref: A-XIV] They are among the highest-value commercial fish in Tamil Nadu and are actively targeted by local fishers. [Ref: A-XIII] Their presence as nursing juveniles is a key indicator of estuarine health. [Ref: A-IV]

Reservoir Impact: The catadromous migration of *Lates calcarifer* juveniles from offshore into the estuary depends entirely on the salinity gradient as a navigational and physiological cue. Freshwater impoundment blocks this migration permanently. The seabass fishery that supports fishing families across the Kovalam-Kelambakkam coastline will collapse.

Mugil cephalus (Flathead Grey Mullet) | Finfish | Euryhaline

Documented as the third most abundant fish (3.8%) directly in the Muttukadu backwaters water quality study. [Ref: A-X] Mulletts are detritivorous benthopelagic fish that consume biofilm, detritus, and algae from mudflats, making them important nutrient cyclers in the estuary. Juveniles school in large numbers in the backwaters during winter months. Peak spawning is January-February in Indian estuaries, cued to seasonal salinity shifts. [Ref: A-XVI]

Reservoir Impact: Static freshwater impoundment destroys the mudflat biofilm ecosystem that mullets feed on, and eliminates the salinity-cued spawning cycle. The mullet roe fishery ceases. Mulletts also play a critical nutrient-cycling role; their loss further degrades the trophic web.

Chanos chanos (Milkfish) | Finfish | Euryhaline

Milkfish are filter-feeders, consuming phytoplankton and microalgae. Their presence at Kelambakkam reflects the high planktonic productivity of the backwaters, particularly the diatom-dominated communities documented at Muttukadu (*Coscinodiscus granii* dominant at 1.2×10^6 cells/L). [Ref: A-X] Milkfish are an emerging candidate for brackish water aquaculture in Tamil Nadu; the ICAR-Central Institute of Brackishwater Aquaculture (CIBA) facility at Muttukadu, directly adjacent to the Kelambakkam backwater system, achieved India's first captive breeding of the species in 2015 and has since distributed seed to farmers across Tamil Nadu, Kerala, and Andhra Pradesh. This proximity makes the Kelambakkam backwater ecologically significant as a natural nursery and production-support habitat for an aquaculture species of growing national importance. [Ref: A-VI, ICAR-CIBA 2015]

Reservoir Impact: Marine diatom communities (*Coscinodiscus granii*) cannot survive freshwater impoundment. The planktonic food base on which milkfish depend is permanently eliminated. The Muttukadu CIBA facility, which draws on the brackish backwater ecosystem for research and seed production, loses its operating ecological context. The natural nursery function of the Kelambakkam backwater for this species is permanently destroyed..

Lutjanus argentimaculatus (Mangrove Red Snapper) | Finfish | Euryhaline

A strong obligate nursery species: juveniles are exclusively found in mangrove estuaries and tidal creeks during their early life. [Ref: A-XIV] Kelambakkam's mangrove-lined backwater channels are ideal juvenile habitat. Adults migrate to offshore reef systems at 100+ m depth. The species is a high-value export fish; its juvenile presence indicates intact estuarine-reef connectivity along the Tamil Nadu coast. [Ref: A-XVIII]

Reservoir Impact: As an obligate estuarine nursery user with no alternative juvenile habitat, this species faces local extinction from this coastal stretch. Raised bunds sever tidal connectivity, making the mangrove fringe uninhabitable. The reef-estuarine connectivity (a fundamental ecological link) is permanently broken.

Etroplus suratensis (Pearlsplit / Green Chromide) | Finfish | Endemic

An endemic south Indian cichlid found in rivers, lakes, wetlands, and estuaries of India, Sri Lanka, and Bangladesh. It exhibits biparental brood care, where both parents guard eggs and juveniles. Two spawning peaks occur (May-August and November-January), aligning with Kelambakkam's seasonal salinity cycles driven by monsoon freshwater input. [Ref: A-VII] Its presence denotes a healthy, low-pollution estuarine habitat. [Ref: A-IV]

Reservoir Impact: Both spawning peaks are aligned to the monsoon-driven salinity cycle of the estuary. Permanent freshwater impoundment eliminates this seasonal salinity cue entirely. *Etroplus suratensis* loses its only documented Chennai-region breeding habitat.

Pseudetroplus maculatus (Orange Chromide) | Finfish | Endemic

A smaller endemic cichlid found in brackish and freshwater stretches of south Indian estuaries. Often co-occurs with *E. suratensis* and exhibits similar biparental care. Its presence alongside *E. suratensis* at Kelambakkam indicates suitable substrate (sand and mud), moderate salinity, and aquatic vegetation, all hallmarks of a healthy estuarine fringe. [Ref: A-IV]

Reservoir Impact: Embankment construction destroys the natural sand-mud substrate structure on which this species depends for nesting. Freshwater conversion removes the moderate salinity that defines its ecological niche. A second endemic cichlid loses its documented Chennai-region habitat.

Scatophagus argus (Spotted Scat) | Finfish | Marine-Estuarine

Spotted scat breeds in nearshore coastal waters; its advanced larvae actively migrate into estuaries during the fry/juvenile stage. At Kelambakkam, these juveniles (fry stage, 10-12 mm) are recruited into the estuary from the Bay of Bengal during spring-summer months. They are herbivorous to omnivorous, tolerant of wide salinity fluctuations, and grow well in low-saline brackishwater ponds. [Ref: A-XII]

Reservoir Impact: The impoundment blocks the marine fry ingress pathway from the Bay of Bengal. Fry cannot recruit into a freshwater impoundment behind a 4.5-metre bund. Aquaculture potential of this species in this region is permanently eliminated.

Monodactylus argenteus (Silver Moony) | Finfish | Marine-Estuarine

Silver moony is a classic estuarine indicator species, found in the brackish intertidal zone of tropical coasts. Its schooling behaviour in the Kelambakkam backwaters near mangrove prop roots reflects the habitat's structural integrity and connectivity to the open sea. [Ref: A-XII]

Reservoir Impact: Raised bunds eliminate tidal connectivity and mangrove prop-root habitat structure. As an estuarine indicator species, its local disappearance signals total ecosystem collapse. Silver moony cannot colonise or survive in a static freshwater impoundment.

Scylla serrata (Giant Mud Crab) | Shellfish | Portunidae

The giant mud crab is a mangrove-associated portunid crab of immense commercial importance. Females spawn offshore in high-salinity waters; larvae are swept inshore and megalopa settle in estuarine mangrove zones. Juveniles are resident in intertidal mangrove areas at Kelambakkam, providing suitable substrate, food, and shelter. [Ref: A-XI] Local fishers collect wild *Scylla* seedstock for grow-out, a direct livelihood connection to this specific nursery. [Ref: A-II]

Reservoir Impact: Tidal flushing (the mechanism that delivers megalopa into mangrove settlement zones) is eliminated by the embankments. Static freshwater makes mangrove intertidal zones biologically unsuitable for *Scylla* settlement. Wild seedstock collection for crab farming across Chengalpet district collapses.

Scylla olivacea (Orange Mud Crab) | Shellfish | Portunidae

One of four species in genus *Scylla*, *S. olivacea* inhabits the same mangrove and estuarine environments as *S. serrata* but tends to occur at slightly higher salinities. The RGCA Tamil Nadu hatchery programme covers both *Scylla* species, and wild seedstock is collected from estuaries along the Chengalpet coast including the Kelambakkam region. [Ref: A-XIX]

Reservoir Impact: Loss of tidal salinity renders the habitat permanently unsuitable for *S. olivacea*. The RGCA hatchery programme, which relies on wild Chengalpet coast seedstock, loses a critical source population. Government aquaculture infrastructure investment is directly undermined.

Penaeus monodon (Giant Tiger Prawn) | Shellfish | Penaeidae

The flagship shrimp species of Indian aquaculture. *P. monodon* spawns offshore; post-larvae recruit into estuarine nursery grounds where they metamorphose and grow. The Kelambakkam backwaters provide critical PL habitat; studies from the adjacent Pulicat lake/Nemmeli zone directly documented *P. monodon* collection from this stretch of coastline. [Ref: A-II] Tamil Nadu has registered over 3,000 shrimp farms covering 5,745 ha with *P. monodon* as a primary species. [Ref: A-XIII]

Reservoir Impact: The post-larval recruitment pathway from the sea into the estuary is permanently severed by impoundment. Over 3,000 registered shrimp farms in Tamil Nadu that depend on wild PL recruitment from this coastal zone lose a critical natural seed source.

Penaeus vannamei (Pacific White Shrimp) | Shellfish | Penaeidae

Although an introduced Pacific species, *P. vannamei* has become the dominant cultured shrimp in Tamil Nadu since the early 2010s. Its post-larvae are produced in hatcheries along the Chengalpet coast (including near Kelambakkam) and released into farm ponds that draw water from the estuary. Tamil Nadu Fisheries reports *P. vannamei* as the leading shrimp species by cultured area. [Ref: A-XIII]

Reservoir Impact: Coastal aquaculture farm ponds draw brackish estuarine water as a production input. Conversion of the estuary to freshwater makes this water intake ecologically incompatible with shrimp farming. Hatchery operations near Kelambakkam lose their operating environment.

Penaeus indicus (Indian White Prawn) | Shellfish | Penaeidae

The native Indian white prawn, historically dominant in Tamil Nadu estuarine fisheries before *P. vannamei* farming intensified. Directly documented in the heavy metals study from the Nemmeli/Pulicat zone. [Ref: A-II] *P. indicus* juveniles use the shallow mudflats and seagrass beds of estuaries like Kelambakkam as nursery grounds. It is also referenced in FAO reports on Tamil Nadu aquaculture zones including the Chengalpet district coastline. [Ref: A-XXIII]

Reservoir Impact: Mudflat and seagrass bed ecosystems are permanently destroyed by impoundment. *P. indicus*, the native species that historically sustained artisanal prawn fisheries in this region, permanently loses its nursery ground. The ecological and cultural heritage of traditional prawn fishing in the 16 villages around Nemmeli is extinguished.

5. Legal and Regulatory Implications for Aquatic Biodiversity

The Mamallan Reservoir project, as currently designed and being implemented, triggers violations across multiple layers of Indian environmental law and international treaty commitments. The following analysis is specific to the aquatic biodiversity and estuarine ecosystem documented in this report.

5.1 CRZ Notification, 2019

The Muthukadu estuary, its mangrove fringes, and intertidal zones are classified under CRZ-IA/IB, the highest protection tier under the Coastal Regulation Zone Notification, 2019. While the reservoir's embankments are not constructed within the physical boundaries of these zones, the project fundamentally and irreversibly alters the hydrological processes that sustain them. By impounding freshwater upstream

and raising 4.5-metre bunds across the wetland plain, the project eliminates the seasonal freshwater pulses that maintain the 0-35 ppt salinity gradient of the estuary, and blocks the tidal ingress from the Bay of Bengal that defines its brackish character.

The CRZ Notification protects not merely the physical boundary of the estuary but the ecological integrity that gives it legal significance. A project that destroys an estuarine ecosystem's hydrology from outside its boundary is no less a violation than one that builds within it. The Ministry of Environment, Forest and Climate Change (MoEFCC) must assess the project on these terms; the hydrological destruction of a CRZ-IA/IB system cannot be rendered compliant by locating embankments outside the zone's mapped boundary.

5.2 Wild Life (Protection) Amendment Act, 2022

Several aquatic species documented in this report, including *Lates calcarifer*, *Etroplus suratensis*, and *Scylla serrata*, are afforded protection under the schedules of the Wildlife (Protection) Amendment Act, 2022. The destruction of their primary local nursery habitat constitutes an indirect form of species harm that falls within the ambit of the Act's protection framework. The project has not demonstrated compliance with this Act with respect to aquatic species, whose habitat requirements are at least as critical as those of the avifauna more prominently discussed in the Rapid EIA.

5.3 Wetlands (Conservation and Management) Rules, 2017

The Muthukadu estuary functions as the northern estuarine gateway of the Nemmeli coastal wetland complex, already identified as a priority wetland under the Tamil Nadu Wetlands Mission. Rule 4 of the Wetlands (Conservation and Management) Rules, 2017 explicitly prohibits activities that damage or destroy notified wetlands. The State Wetland Authority was not engaged prior to the commencement of construction, which is itself a procedural violation.

5.4 ICMBAs Designation: Wildlife Institute of India

The Kovalam-Muthukadu coastal area is designated as one of 107 Important Marine and Coastal Biodiversity Areas (ICMBAs) nationally, identified by the Wildlife Institute of India using a Conservation Priority Index across 26 sub-indicators aligned with the Convention on Biological Diversity's Aichi Target 11. [Ref: A-III, B-I, B-II] No Environmental Impact Assessment framework has specifically addressed the implications of permanently destroying a nationally designated ICMBAs.

5.5 Environment (Protection) Act, 1986 and EIA Notification, 2006

A project that permanently alters 8,408 acres of coastal wetland, including a nationally designated ICMBAs and the estuarine nursery documented in this report, cannot be assessed through a Rapid EIA based on a three-month dry-season baseline and a six-day site visit. The salami-slicing of the project into phases, presenting data for only 4,375 acres, masks the true cumulative impact on the aquatic biodiversity documented herein.

5.6 International Obligations: CBD, CMS, and CITES

India's obligations under the Convention on Biological Diversity (CBD), the Convention on Migratory Species (CMS), and CITES extend to the protection of estuarine nursery habitats for diadromous and migratory fish species. *Lates calcarifer*, *Lutjanus argentimaculatus*, *Mugil cephalus*, and the penaeid shrimps documented here are trans-boundary species whose population integrity depends on intact coastal nursery networks. Destruction of the Muthukadu estuarine nursery undermines India's obligations under these international instruments and contravenes the National Biodiversity Strategy and Action Plan (NBSAP).

6. Why the Mamallan Reservoir Must Not Be Built: A Unified Case

The evidence documented in this report, spanning species ecology, estuarine hydrology, fisheries economics, legal compliance, and community livelihoods, converges on a single, unambiguous conclusion: the Mamallan Reservoir must not be constructed.

Part A: The Science Is Unambiguous

The 13 species documented in this report are not incidental visitors to the Muthukadu estuary. They are obligate users of brackish estuarine conditions (a salinity gradient, tidal flushing, mudflat substrate, and mangrove fringe) that took centuries of geological and ecological processes to establish. This is not a degraded or marginal habitat. **The eDNA study at Muttukadu [Ref: A-I] documented 156 eukaryote species** from 21 phyla in its waters. It is one of 107 nationally designated Important Marine and Coastal Biodiversity Areas in India.

A freshwater reservoir is not an alternative habitat for these species. It is the categorical absence of the conditions that define their ecology. No mitigation measure proposed in the Rapid EIA (not artificial islands totalling 0.3 acres, not salt-pan conversions requiring years of soil remediation, not 'compensatory wetlands' that take decades to develop biological complexity) can replicate a tidal salinity gradient. The project is furthermore hydrologically unsound for its stated purpose. The Nemmeli wetland receives tidal ingress from two estuaries. The 2021 Pallikaranai reservoir plan was halted on precisely these grounds. The Mamallan project repeats that error at eight times the scale.

Part B: The Law Requires Protection

The construction of the Mamallan Reservoir simultaneously engages violations or compliance failures across the CRZ Notification 2019, the Wetlands (Conservation and Management) Rules 2017, the Wildlife (Protection) Amendment Act 2022, the Environment (Protection) Act 1986, and India's international obligations under the CBD and CMS. No single legal framework permits what is being done.

Most critically: the legal argument for halting this project does not require proving that construction occurs within a protected zone. It requires demonstrating, as this report does, that the project's hydrological impacts irreversibly destroy the ecological character of a CRZ-IA/IB estuarine system, a nationally designated ICMBIA, and a priority wetland under the Tamil Nadu Wetlands Mission, regardless of where the embankments are physically located. The absence of a Comprehensive EIA covering a full annual hydrological cycle means that the aquatic biodiversity documented in this report was never formally assessed prior to construction commencement.

Part C: Communities Cannot Afford This Loss

Thousands of people across 16 fishing villages depend on the Nemmeli coastal wetland and the Muthukadu estuarine system for their livelihoods. The species documented in this report (*Scylla serrata*, *Penaeus monodon*, *Lates calcarifer*, *Mugil cephalus*) are not abstract ecological entities. They are the income, the protein, and the cultural identity of fishing communities that have coexisted with this wetland for generations.

The wild seedstock collection economy documented in this report (mud crab megalopa, tiger prawn post-larvae, seabass juveniles) is a low-capital, community-managed natural resource system that sustains hundreds of families and feeds the aquaculture industry across Chengalpattu district. It cannot be relocated. It cannot be compensated monetarily. It is the product of a specific ecology in a specific place, and that place will cease to exist if the reservoir is built. Their right to livelihood under Article 21 of the Constitution of India is directly at stake.

As the United Nations 2026 World Wetlands Day theme, 'Wetlands and Traditional Knowledge: Celebrating Cultural Heritage', the Nemmeli coastal wetland represents centuries of co-existence between people, fish, birds, and water. That co-existence cannot be reconstructed once the ecosystem that sustains it has been impounded behind a concrete bund.

▲ Formal Position of Suzhal Arivom

The evidence documented in this report (13 obligate estuarine nursery species, a nationally designated ICMBAs, century-old fishing livelihoods, and cascading legal violations) constitutes clear and sufficient grounds for the following: (1) An immediate stay of all construction activities at the Nemmeli coastal wetland under the Mamallan Reservoir project; (2) A Comprehensive EIA covering a minimum 24-month full hydrological cycle including monsoon-season aquatic biodiversity surveys; (3) Formal notification of the Nemmeli Wetland Complex, including the Muthukadu estuarine nursery, as a protected wetland under the Wetlands (Conservation and Management) Rules, 2017; (4) Initiation of the Ramsar Site nomination process for the Nemmeli-Kovalam complex; and (5) Mandatory prior consultation with fishing communities in accordance with Article 21 of the Constitution of India. The Muthukadu estuary is not an empty water body awaiting management. It is a functioning biological system of national significance. Its destruction is not development. It is irreversible ecological loss.

7. Annexures and Citation Index

All inline citations in this document are mapped to their source references below. References are classified by evidence type: Group A (Peer-Reviewed / Scientific), Group B (Government / Regulatory), Group C (Field Surveys), and Group E (Companion Conservation Documents).

Ref.	Author / Source	Document / Findings	Evidence Type
A-I	Balasubramanian VK et al. (2021)	eDNA metagenomics: 156 eukaryote species from 21 phyla at Muttukadu backwaters. Marine Pollution Bulletin.	Scientific / eDNA
A-II	Batvari BPD et al. (2013)	Heavy metals in <i>Scylla serrata</i> , <i>Penaeus</i> spp. from Pulicat/Nemmeli zone. PubMed. [Nemmeli co-authorship]	Scientific / Field
A-III	Jhariya DC et al. (2021)	Status of important coastal habitats of North Tamil Nadu. Kovalam-Muttukadu ICMBAs designation. 107 ICMBAs nationally.	Scientific
A-IV	Mogalekar HS et al. (2017)	Estuarine fish diversity of Tamil Nadu, India. Indian Journal of Marine Sciences, 46(10): 1968-1985.	Scientific
A-V	Mogalekar HS et al. (2018)	Marine and estuarine fish fauna of Tamil Nadu, India. Proc. Intl. Academy of Ecology & Env. Sciences, 8(4).	Scientific
A-VI	Jemi Job N et al. (2022)	Seasonal variation of <i>Caligus</i> infestation on <i>Etroplus suratensis</i> from Cochin Backwaters. Acta Oceanologica Sinica.	Scientific
A-VII	Springer J. Ichthyology (2021)	Reproductive Biology of <i>Etroplus suratensis</i> from a Tropical Estuary in Southern India.	Scientific
A-VIII	Kathiresan K et al.	Survival and growth of <i>Lates calcarifer</i> under integrated mangrove-aquaculture systems, Tamil Nadu southeast coast.	Scientific
A-IX	Ramya Shree N & Malathi E (2024)	Avifauna checklist from Muttukadu backwaters. 124 species, 19 orders, 45 families (July 2021-March 2023).	Field Survey
A-X	Srinivasan et al. (2013)	Water Quality of Muttukadu Backwaters. <i>Mugil cephalus</i> 3rd most abundant (3.8%); <i>Coscinodiscus granii</i> at 1.2×10^6 cells/L.	Field Survey
A-XI	Springer Hydrobiologia (2015)	Life-history, movement, and habitat use of <i>Scylla serrata</i> : current knowledge and future challenges.	Scientific
A-XII	AqualInfo / ENACA (2018)	Rearing of <i>Scatophagus argus</i> and <i>Etroplus suratensis</i> in coastal West Bengal, India.	Scientific

Ref.	Author / Source	Document / Findings	Evidence Type
A-XIII	Govt. of Tamil Nadu - Dept. of Fisheries	Aquaculture statistics: 3,000+ shrimp farms; 5,745 ha; P. vannamei leading cultured species.	Government
A-XIV	FishBase - Froese R. & Pauly D. (2026)	Lutjanus argentimaculatus - Mangrove red snapper. FishBase.	Scientific DB
A-XV	Ayyamperumal et al. (2024)	Distribution and ecological risk of PTEs in Muttukadu backwater sediments. Regional Studies in Marine Science.	Scientific
A-XVI	Bhakta D et al. (2024)	Population dynamics of Mugil cephalus in the Narmada estuary. Regional Studies in Marine Science.	Scientific
A-XVII	PMC - PMC8300130 (2021)	Review of nursery culture of mud crabs, Genus Scylla: current progress and future directions.	Scientific
A-XVIII	ResearchGate (2018)	Small-scale cage culture of Lutjanus argentimaculatus in Karnataka, South India - Gangoli estuary seed survey.	Scientific
A-XIX	SEAFDEC / RGCA (2015)	Soft-shell crab production using hatchery-produced Scylla serrata juveniles, Tamil Nadu.	Scientific / Govt.
A-XX	Ramakrishnan D & Sathiyamoorthy M (2024)	Seasonal distribution and source apportionment of microplastic contaminants along Muttukadu backwater estuary.	Scientific
A-XXI	Springer Thalassas (2024)	Temporal Variations of Shorebird Abundance and Diversity at Muttukadu Backwaters (Sept 2021-Sept 2023).	Field Survey
A-XXII	PMC - Kanyakumari study (2024)	Risk assessment: bioaccumulated heavy metals in Lates calcarifer, Nemipterus japonicus using ICP-MS.	Scientific
A-XXIII	FAO Regional Study	Environmental Assessment and Management of Aquaculture Development - Tamil Nadu shrimp farming zones.	Regulatory / IGO
A-XXIV	ARC Journals (2024)	Etroplus suratensis - taxonomy, biology, ecology, aquaculture, nutrition, genetics.	Scientific
B-I	WII / Saravanan, Sivakumar & Choudhury (2013)	Important Coastal and Marine Biodiversity Areas of India. ENVIS Bulletin Vol.15, WII Dehradun. Kovalam-Muttukadu listed.	Govt. Designation
B-II	WII ENVIS Official Database	ICMBAs in India - wiienvs.nic.in. 62 west coast + 44 east coast = 106 sites (updated to 107 per Jhariya et al. 2021).	Govt. Database
B-III	RGCA - Rajiv Gandhi Centre for Aquaculture (MPEDA)	Mud crab (Scylla serrata) hatchery operations, Tamil Nadu. Chengalpet coast wild seedstock dependency.	Govt. Research Body
E-I	Suzhal Arivom Conservation Report (April 2026)	Nemmeli Coastal Wetland Complex: Ecological Significance, Anthropogenic Threats, and Conservation. Primary companion document.	Companion Report

End Note

This report is issued by Suzhal Arivom, a grassroots volunteer-based research organisation committed to local ecosystem conservation, climate change literacy, and mitigation. All data and insights presented herein have undergone expert review, with references duly cited in accordance with accepted academic and legal standards of documentation. This report serves a dual purpose: as a scientific species nursery documentation record, and as conservation evidence against the proposed Mamallan Reservoir project. It is a companion document to the Suzhal Arivom Conservation Report on the Nemmeli Coastal Wetland Complex (April 2026). The intent of this publication is to underscore critical technical gaps in environmental assessment and to place on record the irreplaceable aquatic biodiversity of the Muthukadu estuarine system, in exercise of the right to information and the duty of care toward the environment under the precautionary principle and the public trust doctrine.

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