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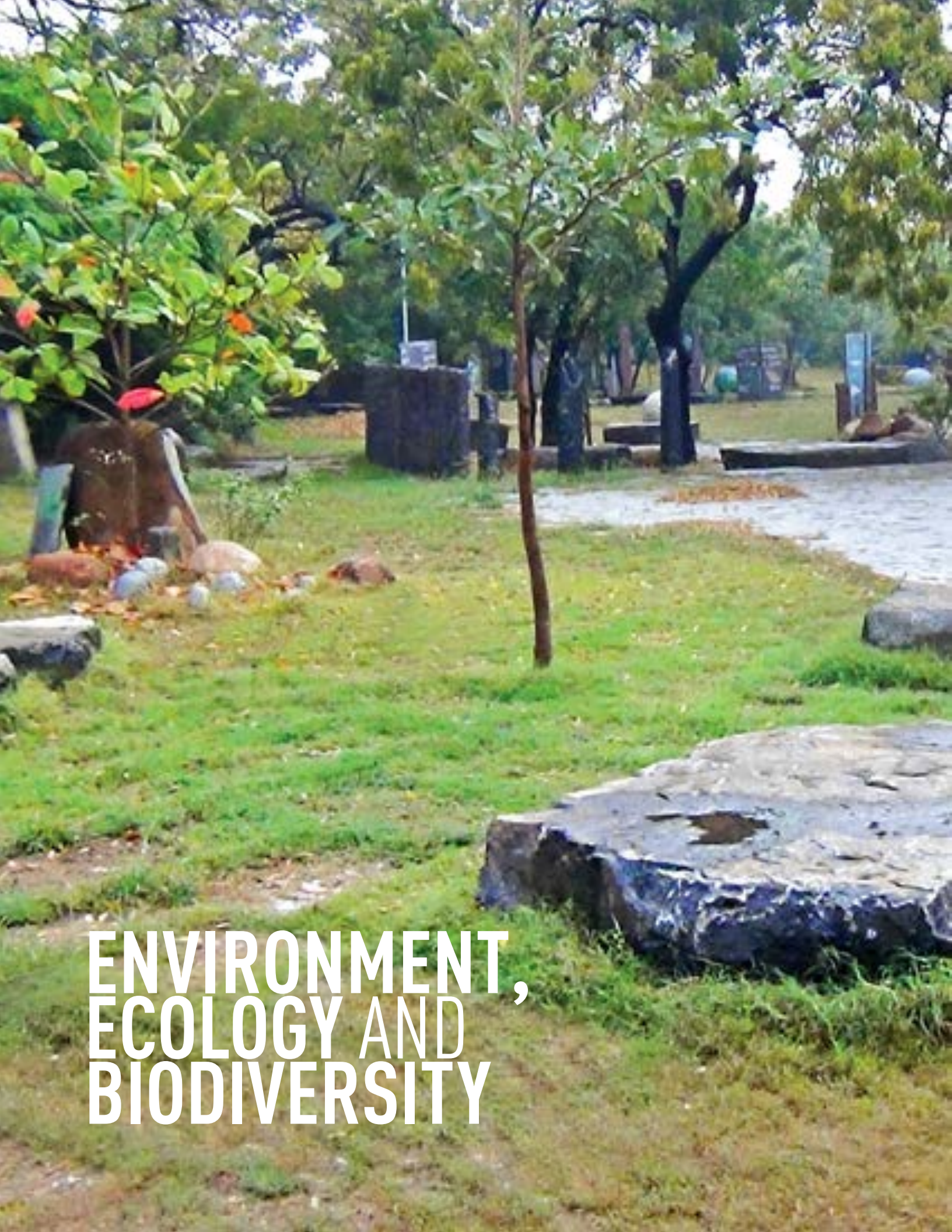
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ENVIRONMENT, ECOLOGY AND BIODIVERSITY

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AN ECOLOGICAL MASTER PLAN FOR ADYAR POONGA CREEK & ESTUARY



COROMANDEL COAST
Year 1753

The Coromandel Coast refers to the stretch between Point Calimere, near the delta of the Kaveri River in the south, to the mouths of the Krishna River in the north along the Bay of Bengal. The coast is home to the East Deccan dry evergreen forests, which run in a narrow strip along the coast. It also has extensive mangrove forests along the low-lying coast and river deltas, and several important wetlands that provide habitat to thousands of migrating and resident birds.

The Adyar River, fed seasonally by the rains, originates from the Chembambakkam and Sriperambatur tanks in the Chengalpattu district. It flows a distance of about 40 kilometers eastwards to join the Bay of Bengal in the southern part of Chennai City. Along its course, it is joined by the Mambalam drain, Buckingham Canal, and many sewage and stormwater drains of the city. Many significant historic buildings and institutions are also located on the banks of the Adyar.

Adyar Estuary and Creek

In the city of Chennai, it forms an estuary at its mouth extending from the sandbar to the Kotturpuram Bridge. The river takes a northward bend at the estuary into the mainland and curving gracefully, almost surrounds the Quibble Island, forming the creek. This estuary's wetland provides habitat to thousands of resident as well as migratory avian and aquatic species. The region, with the presence of Guindy National Park, Theosophical Society, and other Institutional greens, along with the estuary, forms the green lungs of the city. The location of two of the city's most popular public spaces—Marina and Elliot's Beach, on its two ends—makes it a very significant urban space.



SITE
Google view of the site
and surroundings,
2007

The Project

The project was initiated for the creation of an Eco-park in 58 acres to restore the ecological balance and raise public awareness on environmental issues. Later, the Government initiated an ambitious project to include and encompass the edge restoration of the Creek and Estuary as well. Finally, Ecological Master Plan was envisioned at a conceptual level for the Adyar creek and estuary [358 Acres] and a detailed ecological restoration plan and design was done for the Adyar Poonga [58 acres].

Site Context

The area along this part of the river Adyar has mixed-use with primarily residential and institutional zones. A concentrated city-level commercial development is being conceptualized and executed on Quibble Island facing Srinivasapuram. In the last decade, continual dumping of construction debris and garbage on the edges of Quibble Island and Srinivasapuram has heavily polluted the creek and estuary. Most of the roads in the area have widening proposals with new bridges, as well as the widening of the Thiru Vi Ka Bridge. Reconstruction of Srinivasapuram is another major proposal in the area. The area is ably connected by a network of busy roads—Greenways Road, R.K. Mutt Road, D.D. Road, and Santhome High Road—with Foreshore Estate Bus Terminus and Mandaveli Bus Terminus and MRTS Station in close proximity. Being an institutional zone, a considerable decrease in the volume of traffic is found during off-peak hours and holidays.



VIEWS

*Views of the Adayar Poonga
Estuary Creek, 2004*

Ecological Restoration – Planning Concept

The first step towards ecological restoration is to define and secure the edges of the creek and estuary from the surrounding urban development activities. The best method to secure the edges is to bring public watch and ward by providing public access to these. Once the edges are protected, restoration of these edges with mudflats, mangroves, and other appropriate habitats would follow.

An Urban walkway is proposed along the edges of the creek abutting the Quibble Island, which will provide an opportunity for people to enjoy the spectacular view of the creek and estuary. On the other side of the creek, the walkway will follow the edges of Foreshore Estate Loop Road, Srinivasapuram Housing Colony as well as the beach, connecting public spaces and institutions such as ecological interpretation centres, marine aquarium, etc.

There are five outfalls entering into the Poonga area including four stormwater and one wastewater sewer. Stormwater sewers have an important regulatory function to drain off high rainfall peaks from adjacent residential zones and prevent these areas from getting logged by stagnating water. The creek and the estuary are natural stormwater retention areas, which will buffer storm rainfalls during the monsoon season and during cyclones. It was found that most of the sewers were transporting high loads of wastewater, with pollution levels much higher than CPCB Permissible limits. Therefore, the entry of wastewater into the Poonga was arrested in collaboration with CMWSSB. A 'Pollution Watch' was initiated to continuously monitor the flow in outfall.



SITE CONDITIONS

*Part views of the existing site
prior to the commencement
of the project*



Ecological Restoration of Adyar Poonga Design Concept

CONCEPTUAL STAGE 1

It emphasizes ecological land use principles while addressing the site as a stormwater recharge and discharge zone. The site's interaction with the estuarine ecosystem of the creek becomes an important feature, and its separation from the recharge zones through simple water balance mechanisms is devised. The concept is to establish species patches with interactive edges creating a holistic mosaic.

CONCEPTUAL STAGE 2

Earth berms along the boundaries are proposed to reduce sound and visual pollution hence creating an ecological edge. Directing the stormwater to a single point at the park and recycling it before discharging into the creek is another important aspect of the plan.

CONCEPTUAL STAGE 3

Conservation and Ecological Restoration are looked at as governing principles of the project, thus limiting the arrival and orientation zone to a small fraction of the site's area and keeping the larger area of the site less disturbed by activities. Considering the heavy traffic on Greenways Road, the plan proposed only entry and drop-off from this road and exit through T.P. Scheme Road to the R.K. Mutt Road.

CONCEPTUAL STAGE 4

This plan clearly delineates various ecological zones and appropriate methods to introduce biodiversity. The possibilities of developing a park educational facility on the land abutting R.K. Mutt road have been conceived. A design has been evolved for treating sewage from the adjoining Metro water pumping station to cater to the water needs of the park.

Ecological Restoration Design

ZONE 1 | STORMWATER RETENTION AND INFILTRATION ZONE

The periphery of this area is composed of earth berms covered with TDEF [Tropical Dry Evergreen Forests] vegetation—the native coastal forest ecosystem found along the southern Coromandel coast. It also includes a few freshwater ponds.

ZONE 2 | STORMWATER DISCHARGE ZONE

A clear passage for stormwater is proposed by rebuilding the Karpagam Bridge. It is proposed to reuse the large amount of debris dumped in this area to create hillocks [earthen berms] on either side of this zone. TDEF vegetation would cover the banks of the stormwater channel.

ZONE 3 | BRACKISH WATER WETLAND ZONE

It is connected directly to the creek and estuary. Mudflats naturally occur in this zone and it is proposed that these be planted with mangroves and their associates. There is a need to improve the water quality of the creek and estuary for any successful restoration of the area.

Biodiversity Restoration

Although it is not possible to restore the Poonga, Creek, and Estuary to their former pristine state, bio intervention can make it an ecologically significant and sustainable place, and also mitigate many of the issues in the larger creek and estuarine region. Eradication of *Prosopis juliflora*, implementation of a Water Management Plan, and the deepening of existing waterlogged areas to create a stormwater reservoir and the introduction of appropriate floral biodiversity are some of the steps. Tropical Dry Evergreen Forests [TDEF] are found along the Coromandel Coast from Vishakapatnam to Point Calimere, existing as a narrow belt approximately 40 km along the coast. In the Poonga Master Plan, TDEF planting is mostly concentrated around stormwater retention ponds, in the dry areas. Wetlands with marshlands, mudflats, mangroves, and associated flora and fauna are the fundamental component of a coastal landscape. These are dynamic water systems, which encounter constant interaction of freshwater and saltwater supporting a variety of species in various stages of their life cycle. Adyar Creek is one such system, which the master plan proposes to revive and restore into a healthy example of a coastal wetland. Mangroves and mangrove associates that are tolerant of inundation and salt are considered to be globally endangered and hence their introduction to the park has high conservation value. They are proposed to be planted in the eastern reaches of the park.



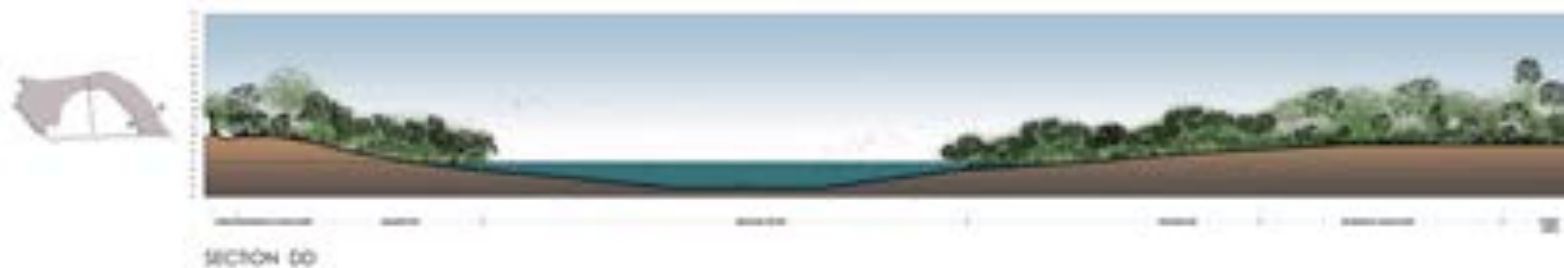
Master Plan

With a variety of natural areas—forest, marsh, ponds, creeks, and mangroves, the Adyar Estuary, restored with Coromandel Coast ecosystems, is proposed to be a natural hub providing interactive environmental education and research for schools, educational institutions, eco clubs, bird watchers, nature enthusiasts, and the general public. It is proposed as a place to demonstrate solutions to environmental problems, create awareness, inspire people to change, and influence decision-makers to choose the right environmental solutions for the city of Chennai.



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|-------------------------------|--|
| TROPICAL DRY EVERGREEN FOREST | STORM WATER RETENTION RESERVOIR WETLANDS |
| HILLOCK | STORM WATER INFLOW |
| MANGROVES | BRACKISH WATER WETLANDS |
| MANGROVES ASSOCIATES | FIELDS |
| MEADOWS AND GRASS LANDS | FARM AND VEGETABLE GARDEN |
| REEDS AND MARSHES | NURSERY |
| MUD FLATS | AVENUE TREES |
| FRESH WATER POND | |

SECTIONS





VIEWS
Part views of the restored
Adayar Poonga complex

Ecological Restoration

The ecological restoration of Adyar Poonga was a long-drawn process. Tamil Nadu Government constituted Adyar Poonga Trust, which appointed TNUDF as the nodal agency for the preparation of Master Plan, Detailed Design, and Implementation. A consortium of consultants was appointed under the leadership of Joss Brooks, a well-known ecologist who has experience over several decades of doing large-scale ecological restoration projects.

The principal design team included the following people:

- Joss Brooks [Ecologist] & Eric Ramanujam [Faunistics Expert] of Pitchandikulam Forest Consultants, Auroville
- Biley Menon [Urban Designer], Chitra Biley [Landscape Architect] & Michael Little [Landscape Architect] of Idea Design, Cochin / Bangalore
- Dirk Walther [Water & Sanitation Expert] of Centre for Environmental Studies, Anna University

An ecological site analysis was conducted and a detailed assessment of edge conditions was done for the 58 acres of site area. A detailed traffic survey was conducted which was useful to locate the entry and exit points to the project site. 8 observation wells were made for continuous weekly monitoring of water quality. Flow measurements were recorded throughout the project period during normal days and during monsoons and cyclones. A detailed investigation of the waterbody was conducted to assess the nature of various types of pollution.

The concept design had to consider city-level stormwater drains, tidal variations in the brackish water ecosystem of the estuary, and managing huge amounts of debris, rubbish & organic waste. A detailed technical plan for ecological restoration was developed. The entire park was divided into a combination of freshwater and brackish water ecosystem. The plan involved solutions for total water management during storms, tides, spring tides, floods, and drought situations. Large earthen berms were proposed along the periphery of the park to bury all the debris and rubbish below them. This enables a visual and sound buffer from the surrounding urban edges. The topographic alterations ensured the careful creation of water bodies and hydrodynamics.

Apart from the preparation of the master plan, the task involved several stages of field surveys, continuing studies on soil and water conditions of the Poonga, and making several representations to the City's administrative bodies to attempt and stop the continuing flow of sewage and dumping of debris. Parallel to this, the team worked on developing a nursery at the site, which became the nerve center for planning and design, involving local citizens. The nursery also became the center for environmental education and outreach programs involving schools in the region. Soon, the school children and local citizens became campaigners of the project.





VIEWS

Part views of the restored Adayar Poonga complex

The restoration process was a mammoth effort involving developing and planting of lakhs of seedlings. Students groups and local citizens involved in the planting process. Various activities were introduced to engage the kids with the ecological restoration of the park. And what was once a dump yard for rubbish and debris and solid waste, where sewage used to flow and soil ph used to be acidic, restored itself into a beautiful piece of nature, creating full-fledged freshwater and brackish water ecosystems, developing its own forests, swamps, lakes, mudflats, and mangroves. The effort resulted in creating a picturesque ecosystem, which saw the return of over 100 species of birds and over 100 species of fish among many other amphibians, reptiles, and small mammals.

BIODIVERSITY RESTORATION

Although it is impossible to restore the Poonga, Creek and Estuary to its former pristine state, bio intervention can convert the poonga space into an ecologically significant and sustainable one, and also mitigate many of the problems in the larger creek and estuarine region. The process has to start with the phased eradication of *Prosopis juliflora*, implementation of a water management plan and the deepening of existing water-logged areas to create a stormwater reservoir and finally the introduction of appropriate floral biodiversity. As part of the restoration plan several faunal conservation and reintroduction strategies are planned. These include introduction of freshwater fish, brackish water fish restocking and creating nesting platforms for aquatic birds.

FEATURES	FLORA	FAUNA	REMARKS
TROPICAL DRY EVERGREEN FOREST [TDEF] This forest type is found along the Coromandel coast from Vishakaptanam to Point Calimere. In Master Plan, TDEF planting is mostly concentrated around storm water retention pond, in the dry areas.	<i>Aglaia elaeagnoidea</i> <i>Atlantia monophylla</i> <i>Crateva adansonii</i> <i>Capparis brevispina</i> <i>Bauhinia recemosa</i> <i>Salvadora persica</i> <i>Diospyros chloroxylon</i> <i>Benkara Malabarica</i> <i>Bauhinia recemosa</i> - fruits <i>Capparis brevispina</i> - fruit <i>Cassia fistula</i> - flower <i>Chloroxylon swietenia</i> - flowers	Blue-faced Malkoha Common Garden Lizard Drongo Hoopoe Shikra Sunbird Tiger Centipedes Treepie and Drongo	Like the plants, the animals of the TDEF too are adapted to the dissymmetric climatic regime of the Coromandel Coast. For example, their life cycles are in sync with the rainfall pattern.
HILLOCKS Within the geographic region granite hillocks occur on bedrocks of charnockite. The variation of species on these hillocks vary distinctly from the apron around their base. They are akin to the species of the Eastern Ghats.	<i>Gyrocarpus americanus</i> <i>Sterculia foetida</i> <i>Butea monosperma</i> <i>Euphorbia antiquorum</i> - flowers	Brahminy skink Common Kestrel	Hillocks present a challenge to life forms with extreme micro-climatic conditions. Yet many species thrive here.
PONDS These are stagnant bodies of water. Along the Coromandel Coast such ponds are found near the paddy fields separated from the larger water systems. In the Zone 3 small fresh water ponds are proposed.	<i>Eleocharis actunagula</i> <i>Elodia canadensis</i> <i>Marsilea quadrifolia</i> <i>Typha latifolia</i> <i>Vallisneria americana</i> <i>Ruellia sp.</i> <i>Pistia</i> <i>Lemna minor</i>	Whitebreasted Kingfisher Terrapin Malabar Loach Pond Frog Egrets Black-crowned Night Heron Spotfin Barb Flying or Glass Barb	Life originated in water and most of the earth's life forms still live in it. In fact, water is the defining factor of all life on earth as all organisms are principally made up of water and none can live without it.
GRASSLANDS Along the Coromandel coast, grasslands are found interspersed with wetlands and tropical dry evergreen forests, forming a distinct ecotone. In the proposal, the grasslands add biodiversity to the wetlands and TDEF systems.	<i>Aristida adscensionis</i> <i>Cymbopogon citriatus</i> <i>Cyperus rotundus</i> <i>Vetiveria zizanioides</i> <i>Atistida hystrix</i> <i>Cymbopogon citriatus</i> <i>Cynodon dactylon</i> <i>Saccharum spontaneum</i>	Katydid Praying Mantis	Insects are the dominant life forms here and are preyed upon by secretive fissorial arthropods like scorpions and spiders.
REEDS & MARSHES Reeds and marshes are essential to maintain the ecological balance of the storm water retention area. They provide protective edge habitat supporting a large number of species.	<i>Aponogeton natans</i> <i>Arystida sp.</i> <i>Scirpus grossus</i> <i>Typha angustata</i>		
BRACKISH WATER LIFE		Plovers Mulletts Cormorants Mangrove Snapper	The waters of estuaries, too salty for normal freshwater animals and not salty enough for sea creatures have their own specially adapted inhabitants. There are innumerable species which depend on this dynamic system.



INTEGRATING THE POONGA TO THE COASTAL WETLAND

Wetlands are the fundamental component of a coastal landscape. The marshlands, mudflats, mangroves and associated flora & fauna are its components. These are dynamic water systems, which encounter constant interaction of freshwater and saltwater supporting a variety of species in various stages of their life cycle. Adyar creek is one such system, which the master plan proposes to revive and restore into healthy example of a coastal wetland.

FEATURES

MANGROVES & ASSOCIATES

Mangroves and mangrove associates are considered to be globally endangered and hence their introduction to the park has high conservation value. Mangroves and mangrove associates that are tolerant to inundation and salt, are proposed to be planted in the eastern reaches of the park.

Aegiceros
Avicennia sp.
Rhizophora sp.
Thespesia populneoides
Sarcobolus carinatus
Suaeda maritima
Derris trifoliata
Salicornia sp.
Suaeda maritima



Arrival & Orientation Zone

A drop-off and entrance [from Greenways Road] allows vehicles to travel through the orientation zone that is connected by parking areas and bus-bays and to exit [onto the T.P. Scheme Road]. Considering the linear form of the park, another entry and drop-off point is from the South Canal Bank Road. Security and amenities are located at the entry and exit points.

An orientation centre informs and guides the visitors. It has bus bays and parking areas for bicycles, two-wheelers, four-wheelers, and the disabled, with winding roads to reduce the traffic speed. A walk winding through the orientation zone is designed with ecological information presented in the form of artistic paintings on locally available stone slabs, involving local artists. The walk culminates at the arrival court, which displays specimens of local geology, in the handcrafted paving and seat walls.

Interactive Education Zone

Though the park is primarily designed to merge with the proposed ecological zones, the foremost area is designed as small educational and cultural gardens. An amphitheater, with a capacity to house 250 people interspaced with trees, plants, and stone boulders is planned for environmental education programs and related activities. It is also used for staging regional art forms.

In design, it uses the slopes of the earth berm for the seating area with seats separated by grass sections, trees, and rock patches between them while the stage is a raised podium facing away from the central stormwater retention pond. Solar lighting and a controlled and distributed sound system are also part of the design. Located in a segregated place among the earth berms, is a children's garden, in which all the materials used for creating play equipment are recyclable or natural. An interactive children's learning space with various play facilities teaches them about the wonders in nature.

Ecological Livelihood Zone

An organic farm and vegetable garden in the park exhibit the food crops of the region while demonstrating examples of city farming and composting methods, and the nursery of indigenous species supplies plants for the park.



VIEWS

Part views of the restored Adayar Poonga complex with its Arrival Zone, Interactive-Education Zone, etc.

Environmental Education

A centre for excellence in environmental and sustainability education provides pathways for the local community to be actively involved in the restoration, offering certified vocational training and outreach programs through education, research, and awareness and advocacy. Long-term volunteer programs allow interested citizens and national and international visitors to participate in research, ecosystem restoration, and maintenance. Various programs are centred on the areas of Bioregional Studies, Watersheds, Land and Water, Biodiversity, Waste Recycling, Organic Agriculture, Water Ecosystem Exploration, and Energy Initiatives. The school programs are developed around a planned interface with the environment in the Poonga and an off-site program in the schools for classwork and de-briefing.



Environmental Education Outreach Program

Sustainable Schools Program to create an eco-friendly school with a smaller ecological footprint and thereby conserve our sparse resources;

Continuing Education Programs to cater to adults who wish to take up a formal study of the various study themes offered at the centre;

City Farming to recycle recyclable garbage to grow fruits and vegetables at home;

Bird watchers Study Group [Ornithology] to learn conservation values, with birds and the habitats that sustain them under topics of Principles of Conservation, Habitat Study, Preservation of Bio-diversity, and Saving Endangered Species of Birds; and,

Adyar Poonga Bus, a mobile education exhibition and interpretation unit to build the outreach program, which periodically visits schools and builds awareness on environmental themes.

EDUCATING THE YOUNG

A continuous Environmental Education Outreach Program is an integral part of the project



All drawings and images courtesy Idea Design