ADYAR POONGA ECOLOGICAL RESTORATION PLAN

Volume 1: Executive Summary

Submitted By

ADYAR POONGA TRUST

October 2007

Lead consultants

PITCHANDIKULAM FOREST CONSULTANTS
Auroville, Tamil Nadu, India.

ADYAR POONGA Ecological Restoration Plan (58 Acres)

Volume 1: Executive Summary

Series

Adyar Poonga Ecological Restoration Plan

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Volumes in the Series

Volume 1: Executive Summary
Volume 2: Master Plan
Volume 3: Drawings
Volume 4: Appendices

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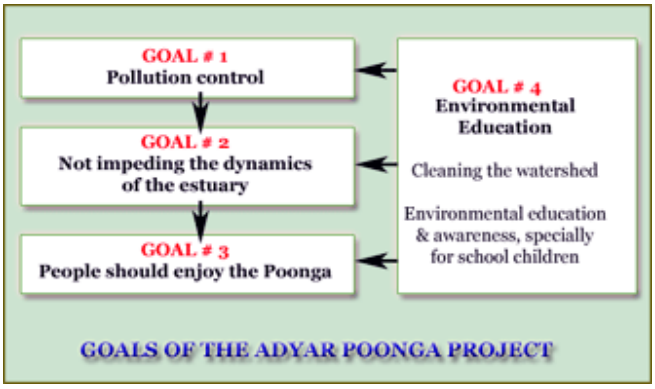
C O N T E N T S

1 Introduction to the Adyar Poonga Project

The Government of Tamil Nadu has from 1997 envisaged the creation of an eco park at Adyar Poonga—covering about 358 acres—to restore the ecological balance and raise public awareness on environmental issues. A Trust, headed by the Chief Secretary, under the name of "Adyar Poonga Trust" was formed to create such other systems for the restoration of the Adyar Creek and the Estuary area. The Board of Trustees, by a resolution dated 21.11.2006 appointed the Tamil Nadu Urban Infrastructure Financial Services Ltd., Chennai (TNUIFSL) to identify and engage necessary consultants in the preparation of a concept/master plan, detailed planning and to invite competitive bidders for the development of this landmark Rs 100 Crore Eco-park. Accordingly M/s. Pitchandikulam Forest Consultants (PFC), Auroville, based in the international township of Auroville, which is recognized internationally for its ecological works, were appointed as consultants for developing a Master Plan and other related activities[1].

The 'Terms of Reference' to Lead Consultants: *"Though the success of the project is visible from visionary point of view, it is very important to take the public and the private concerns of Chennai city and those who are interested in protecting the environment."*



The ecological master plan (58 acres) therefore engaged all stakeholders in discussions and participatory processes towards the development of designs for restoration of the degraded wetlands, the construction of new wetlands to improve water quality, manage storm water, enhance habitat, stabilize shoreline erosion and mitigate wetland loss, keeping the urban profile of this site in mind and the critical role of education as a key component to sustainability. Accordingly, the goals of the Adyar Poonga project are highlighted in the figure above.

[1] PFC is collaborating with several reputed specialist consultants like Centre for Environmental Studies, Anna University; Idea Design, Cochin; House of Consultants, Bangalore; Aurore, Auroville; SCD India Ltd, Chennai; CERES, Australia amongst others in the fields of water management, environmental education, flora & fauna habitat mapping, social impact studies, alternative & appropriate technologies, architecture and landscaping

1.1 The challenges of the project

For the development of this master plan we viewed the Poonga, the mudflats and estuary as one ecological system integrating biological, physical and social factors.

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 edges. Once the edges are protected, restoration of these edges with mudflats, mangroves and other appropriate habitats would follow[2]. An urban walkway along the edges of the creek abutting the Quibble Island will provide an opportunity for the people of Chennai and her tourists to enjoy the spectacular view of the creek and estuary.

See Annexure 1 for a project timeline of significant events.

2 Ecological Restoration

Ecological restoration refers to the process whereby an entire ecosystem is brought back to health, by altering a degraded area in such a way as to reestablish an ecosystem's structure and function, usually bringing it back to its original or pre-disturbance state, or to a healthy state close to the original.

Classical environmentalism has equated conservation to mean preservation of natural systems without interference of Man. It is assumed that the ecosystem will regain its resilience and restore itself to its natural state. For this hypothesis, it is necessary that such systems exist far from human existence or that Man is restricted entry into the natural system.

Restoration Ecology is an emerging concept which is pragmatic about the state of our environment and does not share the romanticism implicit in 'Preservation Ecology'[3]. It has been found through experiential learning that Man continues to interfere with the system and that true conservation by preservation fails. Protected forests are illegally cut down or protected animals in sanctuaries are poached. Also, with years of damage, some natural systems are so degraded that a return to its pristine state is not possible. A quest to find a sustainable solution has offered a new paradigm for ecological rehabilitation. This is our approach in the present project

2.1 Water Management Plan

The Centre for Environmental Studies, Anna University, is conducting intensive studies on the pollution of Adyar Poonga. The aim of this study is intended to restore the ecology and prevent this area from future impacts due to pollution and recommend adequate measures to restore the natural character of the wetland.

Six boreholes were sunk at the Adyar Creek area to assess the geological conditions and to develop observation wells for ground water monitoring. The drillings were conducted to full depth till the impermeable layer of the first water bearing aquifer. The observation wells

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[2] See Volume2; Section 2 for images of encroachments, waste dumping, free rein to domestic cattle and water buffaloes inside the Poonga, as well as encroachments along the housing board colony at Srinivasapuram, which pose a huge threat to the creek's ecosystem and the sustainability of the project.
[3] See 'Comparison of Preservation and Restoration Ecology' in Vol.2; Section 4.2.

were provided with screen pipe throughout the length of the aquifer to allow a continuous monitoring of the vertical differences in salinity.

The dynamic water system is divided into two segments: (a) it acts as an extension to the creek and during spring tides or cyclones; the entire Poonga would act as flood sync; and (b) the Poonga acts as the storm water recharge and discharge zone. For this the north-eastern part of the Poonga is deepened to join the creek which would experience daily tidal actions. However, the south-western part of the Poonga which is treated as a swamp is separated by a spillway, centimeters higher than the average tidal levels. However, during spring tides or cyclones, the tidal water would cross over into this swamp[4]. The purpose is also to reduce the pollution of the creek entering in the swamp area of the park every day.

The ground water was found to be predominantly brackish in nature but with a strong tendency towards fresh water in the upstream area. In all the samples total coliforms, BOD, COD, TKN, PO_4 and NH_4 were detected in sizeable amounts. In addition very low DO levels indicate the high degree of pollution due to the continuous infiltration of contaminated surface water. The conclusion is: *The infiltration of highly polluted water into the Adar Poonga has to be stopped. Sludge enriched in organic materials and nutrients has to be removed from the water logged areas of the creek.*

Photo 1. Storm Water inlet from S C B Road near Hindustan Lever

Photo 2. Storm Water inlet from T P Scheme Road

The 'spillway'[5] shown in Photo 1 as a raised level used to provide for the controlled release of flood flows, is a useful water management tool. When the water rises above the lip or crest of the spillway, it begins to be released from the reservoir.

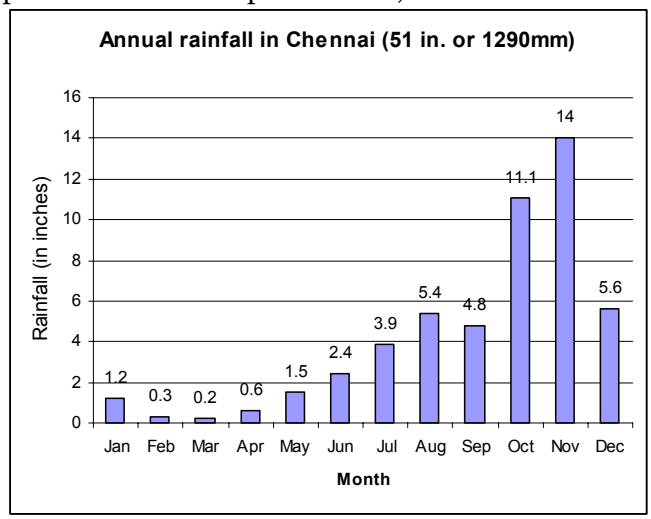
2.2 Water Resource System Design

There are two categories of water required for use in the park: (a) high quality, potable water and (b) standard quality water supply for general maintenance and sanitation. It is estimated that 12 kilo liters of potable water and 200 kilo liters of non-potable water will be the

[4] See Annexure 2: 'Water levels inside the Adyar Poonga at various tide levels'

[5] It is (a) made from earth with a fortified surface to prevent erosion; (b) temporary and can be removed with minimum effort.

daily requirement for the park. A secure and reliable water supply for the Adyar Creek Eco Park will be needed to meet this requirement and ensure the viability of the park. For potable water, Metro Water could be approached to provide the connection and supply. The requirement of about 200 kiloliters per day of standard quality water presents a moderate problem. For non-potable use, the sources of water could be: (a) external water supply through water tankers, (b) the use of bore wells, (c) desalination, (d) purchasing from Metro Water, (e) harvesting rainwater and (f) recycling grey water.



The average Chennai rainfall of ~1.3 m in a year is skewed, with insignificant quantities for as much as 10 months in a year, and then large amounts for the other 2 months. Rain water harvesting alone is therefore not enough to supply the park all year round, without intermittent storage.

Collection of grey water means recycling the non-sewage wastewater from the apartments and residential colonies adjacent to the park. This is a good option since it involves recycling an otherwise wasted resource. Additional treatment of the water would be required at the park using the same methods offered by SCD EM (Efficient Microorganism), flow forms, fishponds, and root zone treatments. It is therefore recommended that the grey water produced within the park be reused.

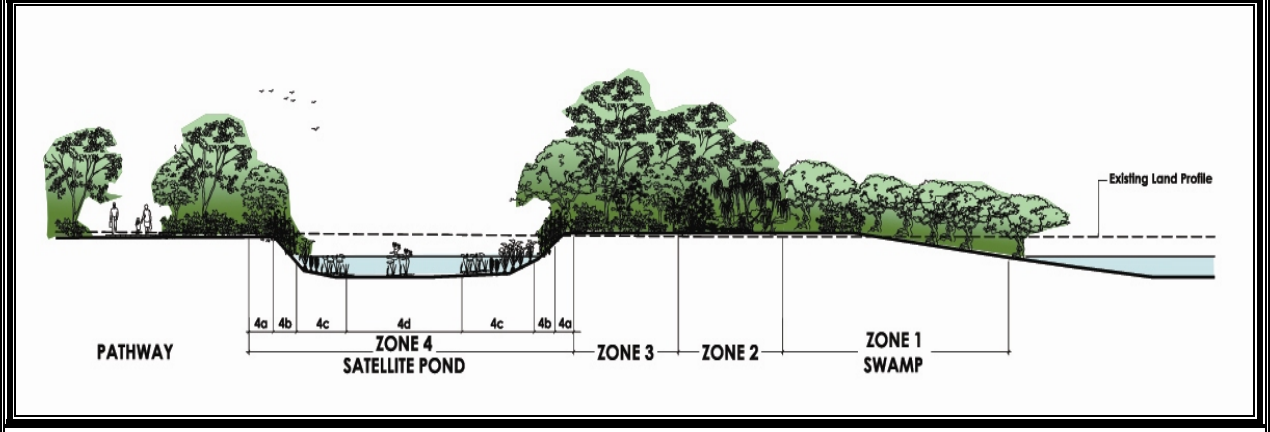
2.3 Flora Survey Vegetation Plan

Restoration of bio-diversity is the principle aim of this project and in this context diverse vegetation zones found along the Coromandel Coast will be recreated. The quantitative assessment of plant species diversity explains the existing life-forms adapted in this area. The diversity study included a total of 5,568 individuals from 62 species and 52 genera. Overall, herbs scored highest of 3,670 individuals, followed by lianas (822) and shrubs (563). Grass (235) and tree species (278) were recorded very low, when compared to other life-forms. At the Site B (*Prosopis* Stand), the number of individuals (total density) <u>is very low, indicating the poor regeneration of all life-forms, in particular tree species</u>.

There is great controversy surrounding *Prosopis juliflora*: unmanaged, it often colonizes disturbed, eroded and over-grazed lands, forming dense impenetrable thickets, alarming ecologists. Globally, exotic species have been found to be an integral component of many areas where restoration has been planned. These situations present many conundrums for restoration: the disruption of hydrologic and riparian processes on one hand, but provides critical habitat for endangered species on the other. This is exactly the situation in the Poonga.

It is proposed to clear the *P. juliflora* by hand clearing and uprooting the root stock. This will be done in a phased manner as presently, the canopy of the *P. juliflora* is the roosting and nesting platform for aquatic birds like the Little Cormorant, Black-crowned Night Heron, Intermediate Egret, Cattle Egret and Pond Heron. Nesting platforms will be provided as

substitutes. It also provides a habitat for forest birds' species. The anticipated change of order will also allow the fauna to adapt to the landscape.



Sectional view of vegetation matrix typical to the swamp area

It is proposed to plant mangroves wherever appropriate throughout the wetlands, which is extremely polluted and the riverine influence has been cut off. Hence the only freshwater flush is from storm water inflows.

2.4 Fauna Survey and Conservation

The methodology for the proposed conservation for fauna is structured as follows:

a) Examine existing fauna in the area of designated area of 58 acres

b) Contrast the findings to the indigenous fauna conditions to a similar landscape in Chennai and along the Coromandel Coast

c) Assessment of the proposed intervention and its impact on the fauna biodiversity

The intent is to create environmental conditions for a typical fauna scenario as surveyed in relatively natural environments. However the proximity to the artificial edges of the city, the influence of novel agents and external influences will determine the equilibrium the system restores to. Some of the human intervention strategies considered are:

- Animal interpretation sites (for example, Barn Owl points)
- Brackish water fish restocking
- Nesting platforms for aquatic birds
- Aquariums to showcase indigenous aquatic plants and fish

3 Ecopark & Components

Inside the park, we plan to have four primary zones: (See Annexure 3 for details)

- **'Arrival and Orientation Zone'**, which will handle the incoming visitors. Entry and exit points, limited parking spaces, security and amenities will be provided in this zone. This zone is limited to the south-western corner of the park in a narrow strip along the boundary. This is to provide safe arrival areas for the visitors and at the same time ensuring minimal disturbance to the rest of the park. Using passes or tickets, people will enter into the second zone:
- **'Interactive Learning Zone'**, which is composed of interpretive education gardens, learning areas and an environmental education center.
- **'Nature Interpretation Zone'**, which has a nature trail with occasional viewing points for people to experience the various ecosystems of the Coromandel Coast. These viewpoints have seating and simple shade net structures which eventually can be removed once shade trees have matured.
- **'Silent zone'**, which is left without public access except for the service pathway.

Although the redevelopment of the area along R.K. Mutt Road is outside the scope of work, they relate in a very integral way to the Adyar Poonga Project. These relate to:

- **Green centre:** A portion of the building at the Fisheries Training Institute site will become the Poonga Administration & Research Center. As part of this proposal, Adyar Green Center, an energy efficient facility with exhibition and orientation spaces would open onto the orientation zone of the park. The facility will also house necessary amenities for the orientation zone.
- The **Adyar Watershed Restoration Institute:** (AWRI) Research building and administration building will be housed in this building. The Administrative block and the Park Wardens office will also be located here.
- **Sewage treatment plant**: To meet the needs of water for the Park, a facility to process the sewage from the New Adyar sewage pumping station will be created

3.1 Environmental Education Strategies

An objective of the restoration project is to provide an environment that will educate the public at 3 levels: (a) At the directly perceivable level, the restored landscape and its various players; (b) At the conceptual level, it deals with the macro issue of the ecosystem, the environment and sustainable living; and (c) The cognitive mind then synthesizes these two streams to create a new meaning.

Creating this meaningful relationship between the perceiver and the environment creates a value. The attributes of this value are a connectedness with the external environment, a sense of place and sacredness. Creating an institutional framework and establishing the **Adyar Poonga Centre for Ecological Studies** is a sustainable initiative to position public

interface around education rather than an exploitative use as merely a civic recreational amenity.

The objectives of the education strategy are:

- Enable Chennai city residents to experience the wonder and importance of ecological diversity
- Communicate scientific studies and research into indigenous fauna and flora
- Raise awareness of local environmental issues
- Within the context of this transformative learning environment, visitors will be inspired and empowered to actively engage in working for the protection and preservation of the Adyar Creek Bio-region

Education Center: The old fisheries building inside the Poonga is proposed to be rebuilt as an Environmental Education Center where programs for visiting school children would be conducted. The Poonga Education Center will offer a series of nature programs designed to introduce visitors to the basic principles of ecology with an emphasis on Coastal Ecology and Watershed Rehabilitation.

Conceptual view of the education centre

These programs will help to nurture a deeper appreciation and reverence for living things and natural systems. Participants will become familiar with plants and animals native to Chennai and learn about their interrelationships and how human activities affect the environment.

Interactive Children's Learning Space: An interactive children's learning space is proposed in the form of play areas. Various play facilities are proposed in this zone which will teach children about the wonders in nature.

Conceptual view of Children's Interactive Learning Space

This area is located in a secluded place among the earth berms. The earth berms will be shaped in animal-forms and will have spaces carved out of them for locating interesting play activities. All materials used for creating play equipment will be recycled or natural. An outdoor education space is proposed for conducting environmental education programs and related activities

An outdoor educational space is proposed for conducting environmental education programs and related activities along with the interactive learning space. The space uses the slopes of the earth berm for the seating area.

Conceptual view of outdoor educational space on the slopes of the earth berm

The seats are separated by grass sections, trees and rock patches between them.

Solar lighting and controlled & distributed sound systems are proposed to enhance the learning experience.

3.2 Social Impact: Community and Stakeholders

The Terms of Reference for the Adyar Poonga Project require that a 'Social Impact Assessment' study be commissioned to complete a sample survey of households, occupation pat-

terns, area of house unit with a report including Resettlement and Rehabilitation of the project affected families within the 58 acre area. The observations and findings of this study are summarized in Volume 2: 'Master Plan'.

3.3 Dissemination and Participatory Appraisal Process

The Master Plan has been developed using Participatory Appraisal techniques. The basic underlying principle of these tools and approaches is that participation leads to a better under-standing of the target beneficiary problems because it involves the different perspectives of all those who experience an issue. It also gives the beneficiaries an opportunity to influence these decisions and gain an ownership over the solution method.

The design process began with a stakeholder identification and analysis of stakeholder expectations and resources for the project. Interim meetings to discuss the evolving design, receiving the feedback and incorporating appropriate suggestions has continued throughout the design. Various environmental groups have been continually appraised of the project and feedback and suggestions received and analyzed. Active citizens and opinion leaders of the community have been invited to tour the site and learn more about the proposed restoration processes. A preliminary demonstration site was prepared to showcase the theme of the restoration and select groups including school teachers have visited the site and offered their feedback.

Government officials drawn from the Civil services, Chennai Corporation and state agencies visit the site periodically to learn about the project and are actively involved in the planning process.

4 Monitoring & Evaluation

The evaluation program will provide an ongoing feedback loop of information to project leaders, staff, clients, funding agencies, partners and other stakeholders. It will begin with the development of a formal Logical Framework Analysis (LFA) or "Log frame" that details all major resources, activities, outputs, outcomes and goals. The key is to focus on the outcomes or changes that the program is intending to create in the environment, the people, the organizations and in the citizen groups, rather than in performance of the activities themselves. The goal is to provide information to project leaders and key stakeholders, not only to facilitate program success, but to provide a framework and structure to validate the assumptions that have been made in the project.

The LFA of this project is shown in Table 34—Volume 2: 'Master Plan'.

5 Business Strategy & Financials

Community participation is not just a matter of compliance with legislations and government directives. We believe that the involvement of local communities in participatory planning and service delivery mechanisms will actually enhance the impact of the Eco Park's ability to restore the watershed. Community participation sensitizes state and local government officials on the dynamics on the ground at any given point in time making service delivery more relevant and appropriate to local conditions. Consultation also closes the gap between the electorate and the elected, resulting in substantive participatory democracy as

the electorate experience the impact of exercising their political rights, which has been shown to lead to growth and investment and overall improvement in the quality of life of citizens of Chennai.

The Eco Park's outreach process includes stakeholder meetings, formal submissions by interested parties, feedback from visitors to the Eco Park, as well as inter-governmental communications.

The feedback from these consultative and participatory processes has helped us to produce a better Master Plan for the Eco Park.

5.1 Institutional Management

It is proposed that the APT constitute the **Adyar Watershed Restoration Institute (AWRI)**, incorporated under Section 25 of the Indian Companies Act, 1956. It is proposed that the park management and the allied education activities be given an institutional framework to protect the prime land from being overused as a civic amenity and of any interference from any pro-development lobby and vested political interests. Creating an institute with a charter, a qualified staff and adequate funding ensures that the project has a long term viability and effectiveness to achieve the project goals. The objectives are:

(1) Provide deep knowledge and understanding of natural systems and our place within them,

(2) Provide connection to, appreciation of, and care for, the natural and social environment

(3) Catalyze and engage citizens in creating a better world

(4) Create a relationship of mutual exchange with the Adyar Poonga, and to do so through the provision of education programs and materials, interactive displays, signage and general tours.

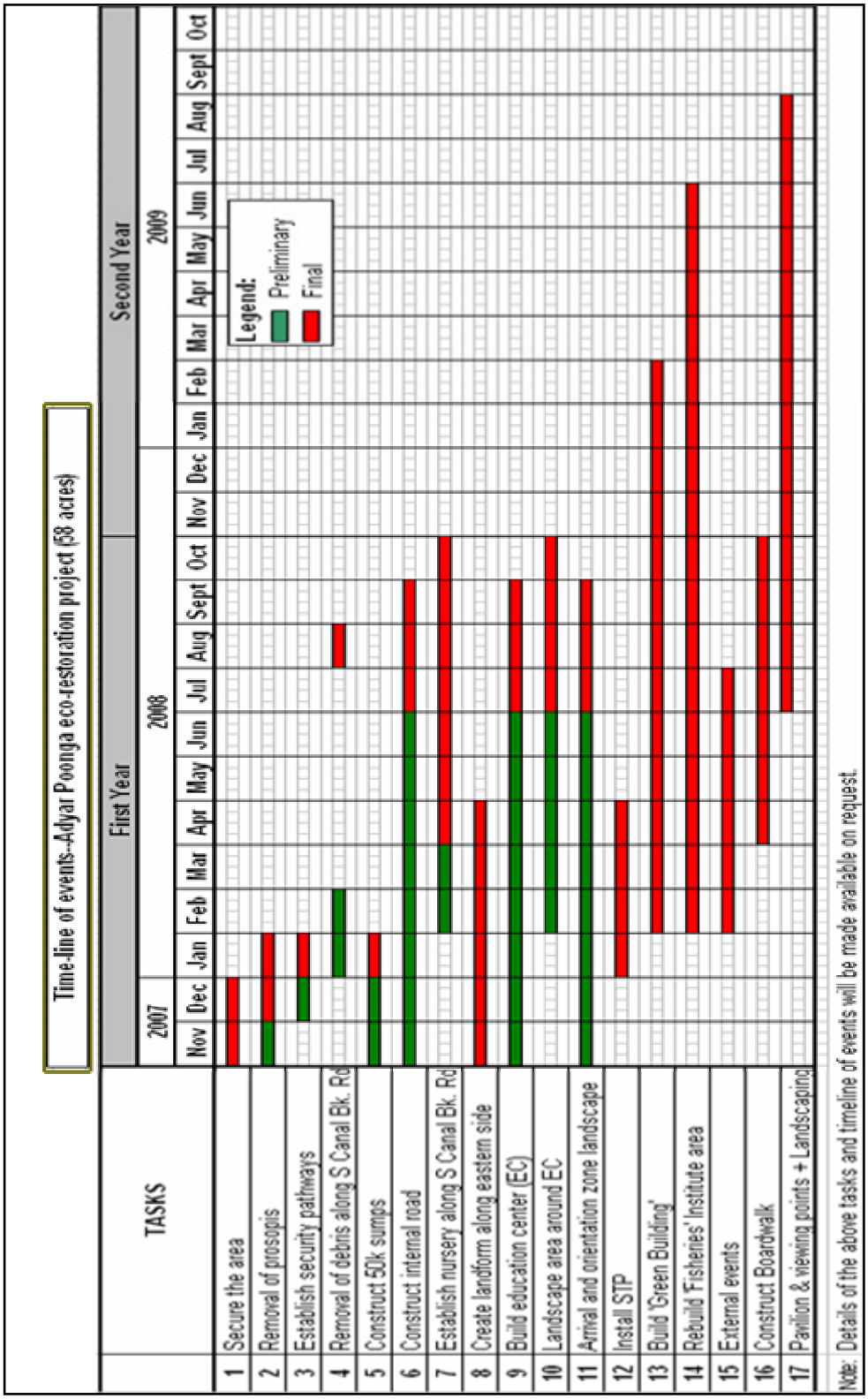
(5) Promote best practice and partnerships in the domain of ecological restoration, preservation and sustainability, and environmental education.

5.2 Business Plan

A park is usually managed as a public good—owned by the government and financed from tax revenues. It requires a sophisticated management structure and can generate sustainable surpluses over expenditure in the long term. The 'Business Plan' brings together department staff, impacted and impacting stakeholders, and the public who use the park in a planning process that will define and clarify the unique "Purpose" and "Significance" of the Adyar Poonga, to attain the long term objective of sustainability.

Collectively, those attributes in the planning and management decisions that impact the park through the implementation of the Management Zone Plan will be reinforced. Future action plans, whether focused on a development proposal, a resource improvement initiative, an interpretive program, or day-to-day management of the park will be guided by the management plan, which is detailed in Section 18 of Volume 2: 'Master Plan'.

Annexure 1: Time line of significant events



Annexure 2: Water levels inside the Adyar Poonga at various tide levels

Annexure 3: Zoning Plan—Adyar Poonga