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**ECODEVELOPMENT PLAN FOR THE MANGALAVANAM  
MANGROVE AREA, ERNAKULAM, KERALA**

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**Submitted to the Kerala Forest Department**



**Sálim Ali Centre For Ornithology and Natural History  
Coimbatore, Tamil Nadu**

**June 2004**

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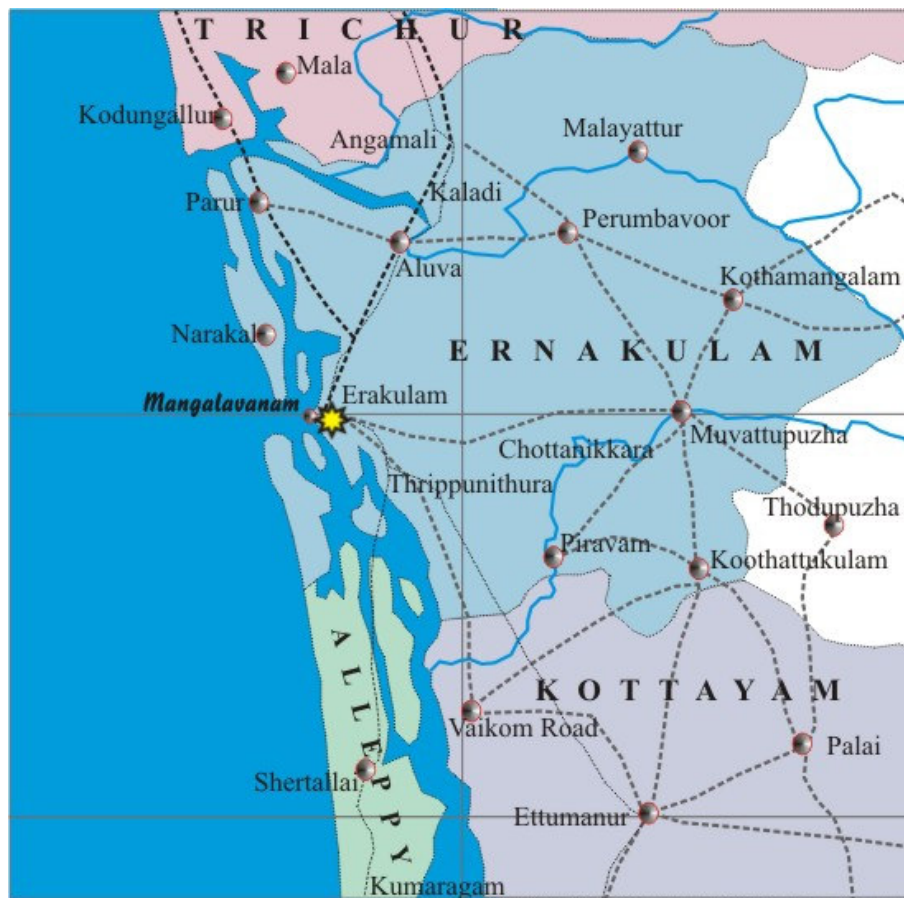
## **Introduction**

The Mangalavanam at Cochin, Ernakulum district, Kerala (Figure 1) is a patch of natural greenery comprising mainly of Mangrove species. Mangroves with a unique combination of specialized plants and animals are known for its fragile nature. They play an important role in stabilizing the land along coast and margins of backwaters. These specialized ecosystems accommodate a variety of marine and freshwater organisms as their nursery and feeding grounds. Mangroves, once common along the costal plains of Kerala, have currently become a rare feature in the state. Except for a few patches and a few rudimentary representations of certain species here and there, mangroves have practically disappeared from the state. Presently the state has only 17 km<sup>2</sup> under mangroves (Basha 1992). This is one of the direct consequences of high population density and intense activities in the coastal belt, despite the coastal regulation zone notification (1991). The Mangalavanam mangrove area is a symbolic relict of the original ecological set up of Cochin.

## **Location**

The Mangalavanam reserve is a small tidal wetland (9°59'13. 4" N and 76°16'26. 1" E) located in the backyard of Central Marine Fisheries Institute (CMFRI) and National Institute of Oceanography (NIO) close to the new building complex of the High court of Kerala. The area is flanked by the Bharat Petroleum campus in the northeast, the old ERG station on south and NIO and CMFRI campuses along the Salim Ali Road on the west. The area is connected with the Cochin backwaters by a feeder canal. Currently the area under protection is only a small patch of greenery with a tidal wetland. For long term conservation and development of the area parts of the adjacent land also has to be incorporated (Figure 2). The details of the ownership and the area of land that can be considered for the development of the Mangalavanam are given Table 1. The total area falls under survey numbers 1137, 1145, 1174, 1146, 1148, 1147, 1140, 1141, 1143, 1151 and 1152 of Ernakulam village (Karunakaran et al 1990)

Table 1 Ownership of land in Mangalavanam (Source GCDA 1998)	
Southern Railway	3.74
Railway land leased to Bharat Petroleum	1.2
Kerala Forest Department	0.73
Corporation of Cochin	0.16
Police Department	0.12
Revenue land	0.26
Poramboke	2.10
Private land	0.13
Total	8.44

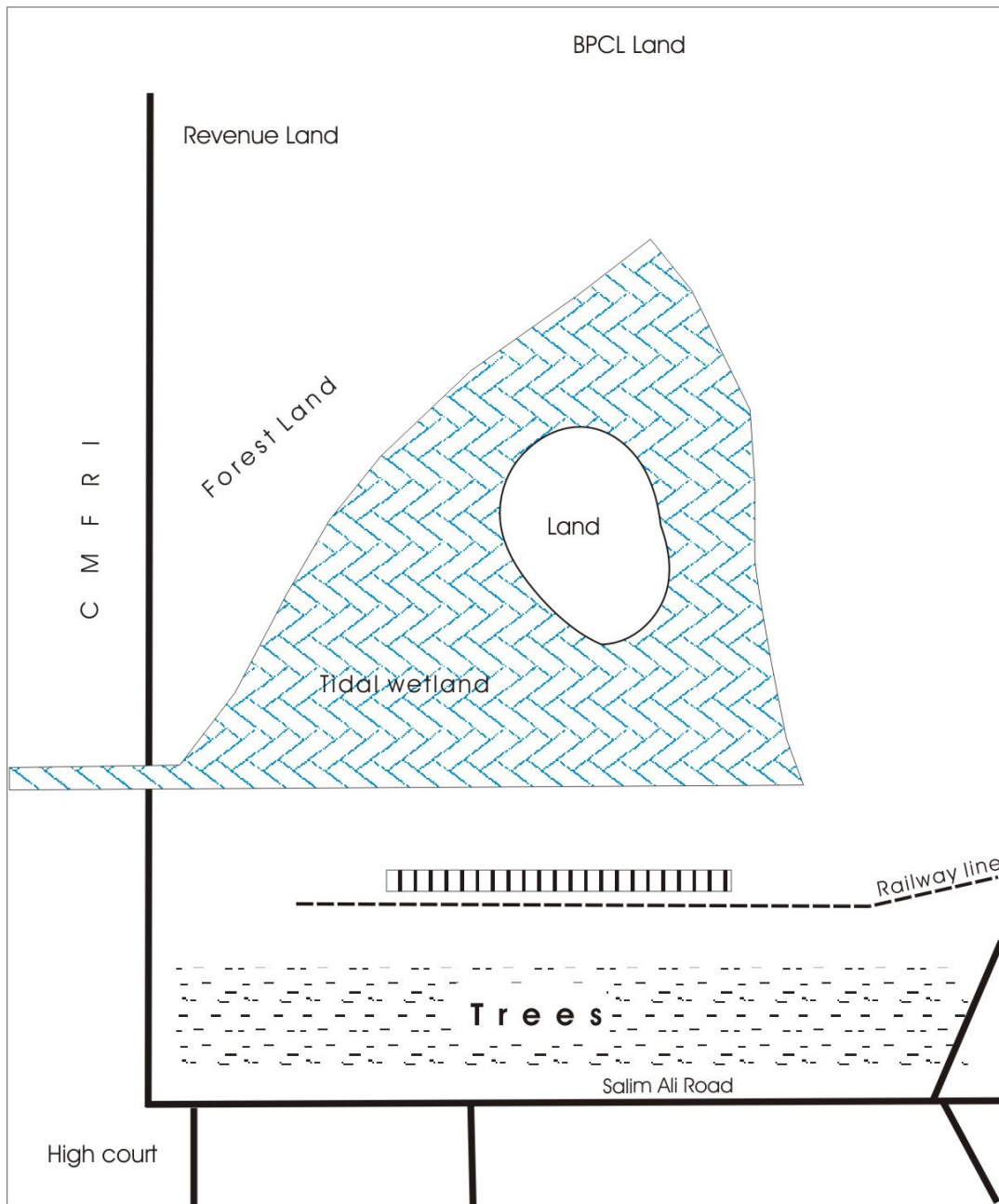


**Figure 1 Location of Mangalavanam mangrove**

### Significance of the area

The very existence of such a unique ecological relict amidst a bustling city like Cochin itself is significant. Despite human pressures of various kinds from all around, the

remarkably high utilization of this habitat by the wetland birds for breeding is another fascinating aspect of Mangalavanam. Such an area in the midst of the bustling activities of the city is very vital as a haven for the avian and other flying creatures. For academic and ecological reasons it is imperative to conserve the area to prevent it succumbing to the multifarious pressures from the expansive city of Cochin.



**Figure 2 Schematic map of the Mangalavanam area**

## Flora

Mangroves in Kerala may be the single most damaged system. The Mangrove area of the state has reduced drastically from an estimated 700 km<sup>2</sup> (Ramachandran et al 1985) to about 17 km<sup>2</sup> (Basha 1991 & 1992). Currently in Kerala, major mangrove patches are seen in Keeryad Island, northern part of Kochi Port and Research Farm at Puthuvypu, Mahe to Dharmadam coastal belt, Mallikkad, Ashram, Pathiramanal and Mangalavanam. In Cochin, mangroves are now mainly found in Mangalavanam, Panangad, Thripunithura, Kumbalam, Nettur, Panambukad, Puthuvype, Vypin, Mulavukad, Kumbalangi, Kannamaly and Chellanam.

The Mangalavanam is rich in floral diversity. Most of the floral species are either mangrove species or those that can tolerate frequent saltwater / brackish water inundation. During our brief preliminary survey conducted in February 2003 twenty-five species of plants could be recorded (Table 2). The floral list is expected to be considerably higher if a seasonal survey is conducted in the area.

Table 2 Plants recorded in Mangalavanam during February 2003		
No.	Species	Habit
1	<i>Acanthus ilicifolius</i> *	Shrub
2	<i>Acrostichum aureum</i> *	Shrub
3	<i>Alternanthera sp</i>	Herb
4	<i>Avicennia officinalis</i> *	Tree
5	<i>Azadirachta indica</i>	Tree
6	<i>Caryota urens</i>	Tree
7	<i>Ceiba pentandra</i>	Tree
8	<i>Coccinia grandis</i>	Climber
9	<i>Cuscuta reflexa</i>	Twiner
10	<i>Derris trifoliata</i>	Straggler
11	<i>Enterolobium saman</i>	Tree
12	<i>Eucalyptus sp</i>	Tree
13	<i>Ficus gibbosa</i>	Tree
14	<i>Hibiscus tiliaceus</i>	Tree



15	<i>Hydnocarpus alpina</i>	Tree
16	<i>Hygrophila sp</i>	Shrub
17	<i>Ipomoea sp</i>	Climber
18	<i>Morinda tinctoria</i>	Tree
19	<i>Polyalthia longifolia</i>	Tree
20	<i>Pongamia pinnata</i>	Tree
21	<i>Rhizophora mucronata</i> *	Tree
22	<i>Tectona grandis</i>	Tree
23	<i>Terminalia catappa</i>	Tree
24	<i>Tinospora cordifolia</i>	Straggler
25	<i>Woodina odiyari</i>	Tree
* Mangrove species		

The vegetation of the Mangalavanam is dominated by *Avicennia officinalis*, *Rhizophora mucronata* and *Acanthus ilicifolius*. True mangrove and mangrove associate species such as *Avicennia officinalis*, *Rhizophora mucronata*, *Acanthus ilicifolius*, *Derris trifoliata* and *Acrostichus aureum* are also present here. Other plant species included, *Alternanthera sp*, *Azadirachta indica*, *Caryota urens*, *Ceiba pentandra*, *Coccinia grandis*, *Cuscuta reflexa*, *Enterolobium saman*, *Eucalyptus sp*, *Ficus gibbosa*, *Hibiscus tiliaceus*, *Hydnocarpus alpina*, *Hygrophila sp*, *Ipomoea sp*, *Morinda tinctoria*, *Polyalthia longifolia*, *Pongamia pinnata*, *Tectona grandis*, *Terminalia catappa*, *Tinospora cordifolia* and *Woodina odiyari*.

## Fauna

Considering the small size of the area, a large number of birds and other faunal elements are reported from the Mangalavanam in the past (Jayson and Easa 1999).

## Butterflies

After the birds it is the butterflies that can attract the attention on visiting the area. During the short visit made to Mangalavanam, seventeen species of butterflies were observed (excluding Heperiidae, Lycaenidae). More species of butterflies are likely in appropriate seasons. By planting suitable larval food plants and flowering plants in the adjacent areas proposed to be acquired the number of butterflies in the area can go up considerably. If

planned scientifically, a good butterfly park can be developed, without much additional monetary burden. The butterfly park would serve as an added advantage and attraction and enhance the tourism potential of the area.

Table 3 Butterflies recorded in Mangalavanam		
Family: NYMPHALIDAE		
1	<i>Acraea violae</i> Horsfield	Tawny Coster
2	<i>Ariadne ariadne palliolior</i> Fruhstorfer	Angled Castor
3	<i>Danaus genutia</i> Cramer	Striped Tiger
4	<i>Danaus chrysippus</i> Lin.	Plain Tiger
5	<i>Elymnias hypermnestra</i> Linnaeus	Common Palmfly
6	<i>Euploea core core</i> Cramer	Common Crow
7	<i>Melanitis leda ismene</i> Cramer	Common Eveningbrown
8	<i>Mycalesis perseus blasius</i> Fabricius	Common Bushbrown
9	<i>Precis iphita</i> Cramer	Chocolate Pansy
10	<i>Precis lemonias lemonias</i> Lin.	Lemon Pansy
Family: PAPILIONIDAE		
11	<i>Pachliopta hector</i> Lin.	Crimson Rose
12	<i>Pachliopta aristolochiae aristolochiae</i> Fabricius	Common Rose
13	<i>Priniceps polytes romulus</i> Cramer	Common Mormon
14	<i>Priniceps demoleus</i> Lin.	Lime Butterfly
Family: PIERIDAE		
15	<i>Delias eucharis</i> Drury	Common Jezebel
16	<i>Eurema hecabe contubernalis</i> Moore	Common Grass Yellow
17	<i>Leptosia nina nina</i> Fabricius	Psyche

## Vertebrates

During the field survey conducted for two days during February 2002, a total of 71 species of vertebrates were recorded. It included two species of amphibians (*Limnonectes limnocharis* and *Bufo melanostictus*), five of reptiles (*Calotes versicolor*, *Hemidactylus frenatus*, *Mabuya carinata* and *Sphenomorphous* sp., *Xenochropis piscator*), 62 of birds and two of mammals (*Pteropus giganteus* and *Funambulus sublineatus*). The dominant vertebrate fauna observed was birds. A total of 398 birds belonging to 62 species were observed during the survey. Aquatic forms numbering 20 species contributed majority of the bird population. Including other earlier records

(Jayson and Easa 1999), the total number of bird species visiting the area is 72. A survey during migratory seasons may add on more species to the list of birds in the area.

Table 4 Birds recorded from Mangalavanam			
No	Scientific name	Common name	Number <sup>\$</sup>
1	<i>Accipiter badius</i>	Indian Shikra	2
2	<i>Acridotheres tristis</i>	Common Myna	6
3	<i>Acridotheres fuscus</i>	Jungle myna,	J&E
4	<i>Alauda sp.</i>	Sky Lark	2
5	<i>Alcedo atthis</i> #	Small Blue Kingfisher	2
6	<i>Amaurornis phoenicurus</i> #	Whitebreasted Waterhen	4
7	<i>Anhinga rufa (melanogaster)</i> #	Indian Darter or Snake bird	16
8	<i>Apus affinis</i>	House Swift	2
9	<i>Ardea alba</i>	Large Egret	J&E
10	<i>Ardea cinerea</i> #	Grey Heron	6
11	<i>Ardea purpurea</i> #	Purple Heron	2
12	<i>Ardeola grayii</i> #	Pond Heron or Paddy bird	24
13	<i>Artamus fuscus</i>	Ashy Swallow-shrike	2
14	<i>Athene brama</i>	Spotted Owlet	1*
15	<i>Bubulcus ibis</i> #	Cattle Egret	18
16	<i>Centropus sinensis</i>	Crow-Pheasant	4
17	<i>Ceryle rudis</i> #	Lesser Pied Kingfisher	2
18	<i>Chloropsis cochinchinensis</i>	Gold mantled Chloropsis	J&E
19	<i>Clamator coromandus</i>	Pied Crested Cuckoo	1
20	<i>Columba livia</i>	Blue Rock Pigeon	18
21	<i>Copsychus saularis</i>	Magpie Robin	2
22	<i>Coracias benghalensis</i>	Indian Roller	2
23	<i>Corvus macrorhynchos</i>	Jungle Crow	4
24	<i>Corvus splendens</i>	House Crow	6
25	<i>Cuculus varius</i>	Brainfever Bird	4
26	<i>Cypsiurus parvus</i>	Palm Swift	6
27	<i>Dendrocitta vagabunda</i>	Tree Pie	1
28	<i>Dendrocygna javanica</i> #	Whistling Teal	4
29	<i>Dicrurus adsimilis</i>	Black Drongo	2
30	<i>Dinopium benghalense</i>	Goldenbacked Woodpecker	1
31	<i>Egretta garzetta</i> #	Little Egret	19
32	<i>Egretta intermedia</i> #	Smaller (Median) Egret	29
33	<i>Elanus caeruleus</i>	Blackwinged Kite	1

34	<i>Eremopterix grisea</i>	Ashycrowned Finch Lark	4
35	<i>Eudynamys scolopacea</i>	Koel	2
36	<i>Halcyon chloris</i>	Whitecollard kingfisher	J&E
37	<i>Halcyon smyrnensis</i> #	Whitebreasted Kingfisher	5
38	<i>Haliastur indus</i> #	Brahminy Kite	4
39	<i>Hirundo smithii</i>	Wire-tailed Swallow	2
40	<i>Megalaima haemacephala</i>	Crimsonbreasted Barbet	1
41	<i>Megalaima viridis</i>	Small Green Barbet	J&E
42	<i>Megalaima zeylanica</i>	Large Green Barbet	1*
43	<i>Merops orientalis</i>	Small Green Bee-eater	4
44	<i>Milvus migrans</i>	Pariah Kite	8
45	<i>Motacilla alba</i>	Pied wagtail	J&E
46	<i>Motacilla maderaspatensis</i>	Large Pied Wagtail	J&E
47	<i>Nectarinia asiatica</i>	Purple Sunbird	2
48	<i>Nectarinia minima</i>	Small sunbird	J&E
49	<i>Nycticorax nycticorax</i> #	Night Heron	45
50	<i>Oriolus oriolus</i>	Golden Oriole	1
51	<i>Orthotomus sutorius</i>	Tailor Bird	4
52	<i>Passer domesticus</i>	House Sparrow	4
53	<i>Pelargopsis capensis</i> #	Storkbilled Kingfisher	1
54	<i>Phalacrocorax carbo</i> #	Large Cormorant	12
55	<i>Phalacrocorax niger</i> #	Little Cormorant	60
56	<i>Prinia socialis</i>	Ashy Wren-warbler	3
57	<i>Psittacula cyanocephala</i>	Blossomheaded parakeet	J&E
58	<i>Psittacula krameri</i>	Rose-ringed Parakeet	4
59	<i>Pycnonotus cafer</i>	Redvented Bulbul	4
60	<i>Pycnonotus jacosus</i>	Redwhiskered bulbul	J&E
61	<i>Pycnonotus leucogenys</i> .	Whitecheeked Bulbul	1
62	<i>Saxicola caprata</i>	Pied Bush Chat	4
63	<i>Saxicoloides fulicata</i>	Indian Robin	1
64	<i>Spilornis cheela</i>	Crested Serpent Eagle	2
65	<i>Streptopelia chinensis</i>	Spotted Dove	2
66	<i>Streptopelia decaocto</i>	Indian Ring Dove	4
67	<i>Tockus birostris</i>	Common Grey Hornbill	1
68	<i>Tringa glareola</i> #	Wood Sandpiper	6
69	<i>Tringa stagnatilis</i> #	Marsh Sandpiper	2
70	<i>Turdoides affinis</i>	Whiteheaded Babbler	8
71	<i>Upupa epops</i>	Hoopoe	1
72	<i>Vanellus indicus</i> #	Redwattled Lapwing	2
# - Aquatic species; * - Calls; J&E - Recorded by Jayson and Easa (1999)			

\$ Number of birds observed during the field visit – February 2003
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### **Conservation importance**

Mangalavanam area is important from the point of view of environmental conservation for a number of reasons, some of which are briefly mentioned below.

- One of the important mangrove sites, in the port city of Cochin that is currently protected and can be developed for conservation and aesthetic purposes.
- Relict of the past natural coastal habitat still enduring the rapid pace of urbanisation and more lucrative land use
- A piece of serene wilderness at close proximity for the urban public
- A haven for large number of wetland birds in the middle of the sprawling city
- A site where migratory species may visit during seasons
- Nesting site of hundreds of avian colonial nesters
- Roosting site for hundreds of flying foxes
- An area with high potential for Nature education to inculcate the values of conservation
- A potential site for ecotourism in a small scale

### **Development plan**

By virtue of being a fragile and sensitive area amidst a growing city, any development plan for the area should essentially be a conservation plan for the area. The development of tourism and associated activities and facilities has to be reckoned as an additional benefit from the conservation plan. However, the idea of such development of the area contributing funds to the exchequer by becoming an ecotourism spot cannot be discounted. Being a small fragile area, the carrying capacity of the region is very low even in physical terms, and the potential for tourism development in the area is limited in

the conventional sense of allowing intensively tourists to directly enter and experience the system. Some steps that may be adopted in this direction are suggested below.

- Some of the adjacent areas that are currently under the control of Indian railway, BPCL, Revenue Department and Corporation of Cochin can be annexed to the Mangalavanam protected area to form a buffer zone.
- Some parts of the BPCL area, which were earlier marshy, may be excavated to form depressions that can be flooded during tidal influx. Such a modification also would facilitate the tidal flux in the system, along with providing a refuge to animals such as fish during low tide. Along the sides of the depressions common local mangrove species may be planted.
- The vegetation of the areas proposed for acquisition may be improved using local plant species in consultation with experts in the field. Plants that can provide sufficient roosting and nesting sites with prolific branching may be given priority.
- It is felt that due to past activities in the environs of the wetland, considerable load of silt has accumulated in the water body. Desilting select areas during appropriate seasons may be helpful in improving the system. Jayson and Easa (1999) and Karunakaran et al (1999) have also suggested desiltation of the pond. However utmost care has to be taken in doing this, because such an activity, if taken up in an intense scale, may disturb the birds. Prior to undertaking such an exercise it is advisable to explore the possible impacts of such an action on the system as a whole. It is also advisable that a proper schedule for the job is made with areas marked properly on a map, bearing in mind the seasonal dynamics of the system, under the guidance of experts including ecologists.
- The area covered by the tidal wetland and the thick mangrove vegetation has to be considered as the core of the protected area. Signboards and pillars may demarcate this area. The boundary of the larger area inclusive of the to-be-acquired lands may be clearly demarcated. Fencing may be done for the purpose.
- Measures may be taken to prevent solid wastes, especially the plastic one from dumping in the catchments of the wetland. Dumping solid wastes within a distance

of 500 meters of the area may be curtailed. It is seen that many solid waste materials enter the area from the sides of the main road. Later these materials float in the water and during low tide get stuck on the grills separating the wetland from the backwaters. Such materials also get entangled with the mangrove roots.

- No liquid waste discharges that may flow down to the mangrove area also should be allowed.
- Visitors should not be allowed to go near nesting trees during breeding season. Presence of human beings disturbs birds. It is found that the birds in Mangalavanam are very wary of people. On seeing an intruder the birds fly away leaving the nest open for attack by nest-robbers such as crows. The crows here have learned quick attack on nests in such situations. Hundreds of eggs from the nest are lost in this manner.
- For observing birds, watch towers can be constructed slightly away from the mangrove area. One of the towers may be located in the railway yard about 30 meters from the mangroves. The second one may be located in the BPCL land towards the northwest of the wetland. The height of the towers may be around 10-12 m that may decide on site. The towers may be equipped with bird watchers telescopes.
- It may be worthwhile to explore the possibility of establishing a walkway or a bridge over the mangroves towards its side. If it is made well camouflaged will be a good means for the visitors to observe birds in their natural activities. Such an arrangement will also generate tremendous interest from the tourists. If properly maintained such arrangement will facilitate in conducting studies on the bird ecology.
- A nature interpretation centre may be established in the existing building under the control of Forest department. The interpretation center may have the major theme as coastal wetland ecosystem especially mangroves. A number of suitable dioramas may be established to demonstrate the system. Interactive monitors that will provide photographic, audio and visual information may be also provided. A library with

books on the relevant topics suitable for non-technical persons may add on to the utility of the setup. A professionally done video recording of the Mangalavanam through seasons may be also made and exhibited.

- A crocodile pond is also proposed on the south of the natural pond connected with the main channel, so that tidal water influences it. According to Karunakaran et al (1990) the salt-water crocodile *Crocodilus porosus* was common in the backwaters of Kerala. However, the pond may be isolated by proper netting so that the individuals do not escape out of the place leading to man-animal conflict.
- Aquarium is another welcome item in the area. The aquarium may exhibit tropical species. Attractive species such as sea anemones, crustaceans, sea snakes and other reptiles may be also exhibited in a recreated natural setup in the aquarium. Both enclosed aquaria and open ponds may be built. Salt water from the main channel may be treated and used for circulating.
- The area along with the suggested adjacent areas may be declared protected under relevant laws



## Plates



Plate 1 a: Mangalavanum during high tide



Plate 1. b. A potential bird habitat to be annexed to the Mangalavanam wetlands





Plate 2a. Night Heron – a common colonial nester in Mangalavanam



Plate 2b: Flying fox colony in Mangalavanam





Plate 3a: Pneumatophores in Mangalavanam indicating healthy mangrove system



Plate 3.b: The wetland beds of Mangalavanam needs cleaning and desilting

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