

TECHNICAL REPORT 190

## Habitat Assessment of Mangalavanam Bird Sanctuary, Kerala

*Submitted to*  
Kerala Forest & Wildlife Department



### **Salim Ali Centre for Ornithology and Natural History (SACON)**

(A centre of Excellence under the Ministry of Environment, Forest and Climate Change,  
Government of India)

**Anaikatty, Coimbatore, Tamil Nadu 641108**

**August, 2017**

TECHNICAL REPORT 190

## Habitat Assessment of Mangalavanam Bird Sanctuary, Kerala

*Submitted to*  
**Kerala Forest & Wildlife Department**

### **Project Team**

Dr.P. V.Karunakaran, Principal Scientist

Dr.Goldin Quadros, Senior Scientist

Dr.S.Babu, Scientist

Mr. J. M.Kuldeep, Project Fellow



**Salim Ali Centre for Ornithology and Natural History (SACON)**

(A centre of Excellence under the Ministry of Environment, Forest and Climate Change,  
Government of India)

**Anaikatty, Coimbatore, Tamil Nadu 641108**

**August, 2017**

## Contents

### Acknowledgements

	Page No	
1	Preamble	1
2	Description of the area	3
3	Approach and Methods	6
3.1	Birds	6
3.2	Environmental Parameters	6
3.2.1	Water sampling and analysis	8
3.2.2	Sediment sampling and analysis	8
3.2.3	Benthos sampling and Analysis	8
4	Results and Discussions	9
4.1	Floristics and Vegetation	9
4.2	Birds	12
4.3	Environmental Parameters	14
4.3.1	Water Quality	14
4.3.2	Sediment Quality	25
4.3.3	Macro benthos	30
5	Observations on the Management Interventions	33
6	Summary and Conclusions	35
6.1	Recommendations	38
7	References	40
	Annexure 1- Plant species recorded from the Mangalavanam Bird Sanctuary	44
	Annexure 2 – Annotated list of bird species found in and around the Sanctuary	46
	Annexure 3 – Physical and Chemical properties of water	54
	Annexure 4 – Physical and Chemical properties of sediment	56

## 6. Summary and Conclusions

Wetlands are one of the most useful natural resource systems, and are “essential life support system”. They take vital role in influencing biogeochemical cycling in the marine environment. Nearly 80% of ocean pollution enters from the land; virtually anthropogenic activities have serious effect on the quality of nearby aquatic environment.

Mangalavanam, being located in the heart of the biggest urban conglomerations in the state of Kerala, has several management issues and threats to its environment. Some of the key issues are heavy siltation of tidal lake, disturbance from movement of people and vehicles, high-rise buildings around the Sanctuary, canopy closure and shrinkage of open waters, heavy pollution of tidal backwaters due to urban sewage, dumping of solid



Canopy overlap- exotic vs. mangrove

wastes, and oil leak from oil-tankers parked close by have already been identified in earlier studies (Jayson, 2001; Karunakaran et al 2015). Decades of development activities carried out in the vicinity of the Sanctuary (Gowshree & Vallarapadam Container Project) and ongoing mass scale construction



Expansion of mangrove vegetation

activities and dumping of both organic and inorganic waste have contributed to very high levels of silt in the waterbody since it is connected to the Vembanad Lake. The continued abuse of the tidal lake for dumping of solid waste materials and urban sewage and the feeder canal polluted with significant traces of oil, most probably leakage from oil-tankers parked nearby, build-up the level of pollution over the

years, has gradually degraded the water quality. Kochi, one of the fast growing urban area in the

country, witnessed a substantial vertical growth in the real estate sector and the proximity of High Court of Kerala adjacent to the PA involves heavy human and vehicular movement in the area. Disturbance from these sources also affect the quality of the Sanctuary environment.

Floristic and vegetation studies in the PA indicated that among the plant species recorded, only 11% are represented by true mangroves and 5% of the species are mangrove associates. The planted species (both exotic and native) constitute the remaining components of floristics. Nevertheless, the estimated canopy cover of the vegetation is dominated by mangroves (60%) than other species. It was observed that at certain sites, the spreading branches of the species *Samanea saman* are blocking the growth of mangroves trees. As a direct fallout of this and presence of stabilized structures on the boundaries of the PA, they have begun to spread towards the lake centre curtailing the area of open waters available for foraging by waders and other waterbirds.

During the present study it was found that the water spread/open area available within the PA is being



Bund/dyke

reduced compared to the previous study. As per the available data (google earth images since 2002) the open area has been reduced to almost 50%, i.e., from 0.92 ha to 0.51 ha. This reduction will negatively impact the habitat use of many wetland birds. Luxuriant canopy of both mangroves and non-mangroves will restrict even the visibility of the open habitat from a distance hence the visit of

birds will be affected.

On birds, during the present survey two more species viz., Painted Stork (*Mycteria leucocephala*) and Asian Openbill (*Anastomus oscitans*) could be added to the list of species thus make the total bird species pool of MBS to 97 species. Nevertheless it is noticed that the habitat of MBS is becoming more towards woodland than wetland. Even the general composition of bird species recorded over the years indicated diminishing number in wetland bird species and increase in woodland species. This may be due to the natural alteration of the habitat in and around the PA.

The physical environmental set up of the Sanctuary has drastically modified by human and natural process. The deposition of sediments from the Vembanad lake, tidal influx and sewage water from the neighbouring commercial and other establishment made drastic impact to the physical and chemical properties of the water and sediment. The litters from the nearby area increased the organic matter load (10.39 %), plying of motor boats in the nearby Lake and heavy vehicular movement in the immediate surroundings of the PA (High Court of Kerala is situated next to the PA) contributed to the high level of oil and other hydrocarbons in the samples. This may cause the death of aquatic fauna as well as they may cover the pores of pneumatophores (breathing roots) of mangroves which can cause the death of mangrove plant if exposed for prolonged duration. The presence of this devastating chemical may reduce the diversity of flora and fauna of the Sanctuary.



Water spread area

The presence of toxic chemicals in the water, may be contributed by small scale industries, affect the food web and may result in a variety of impacts on wildlife, including impaired reproduction, decreased resistance to disease, eventual development of cancerous tissue growth (particularly in fish), neurological damage, and birth defects in offspring (Prabhakar *et al.*, 2012).

In the present study, lower values for nutrients were observed due to tidal flush in the Sanctuary. When water returns to flood the sediment, a high concentration of various substances/chemicals/pollutants may be brought into the PA and absorbed by the substratum.

The higher level of COD, Nitrate, Nitrite etc. will harm the normal hematology of any organism and causes fatality. When the organic nitrogenous waste getting decomposes, the conversion process reduces the oxygen level in the environment and repels the organism from the locality. The fast moving and air breathing organisms comes away but the sedentary animals like molluscs and other benthic organisms die due to critical levels of hydrological parameters.

The diversity of plankton and their heterogenic nature in the environment are considered as index of productivity which decides the health of the ecosystem. The plankton data shows that there is majority of rotifers which is a clear indication of organic and nitrogenous based pollution in the water body.



The poor water and sediment quality and associated plankton data indicates that the food chain from primary producers to secondary and tertiary level is in disruptive links. These loose links will lead to less food availability in the Sanctuary and the birds may stop to come and capitalize another source. Furthermore the present study reveals the status of Sanctuary is in eutrophication and hence periodical sampling is required to understand the diurnal and seasonal variation of tides and monsoon on the plankton in the Sanctuary and impact on biodiversity.

Among the three major management interventions carried out by the PA management, it was found that the installation of PVC mesh was effective through checking the flow of garbage into the PA and other initiatives remain ineffective or resulted in negative impact on the physical environment of the PA.



**Salim Ali Centre for Ornithology and Natural History (SACON)**

(A centre of Excellence under the Ministry of Environment, Forest and Climate Change, Government of India)

**Anaikatty, Coimbatore, Tamil Nadu, INDIA641108**

**Tele: +91-422-2203100; Fax: +91 -422-2657088**

**[www.sacon.in](http://www.sacon.in)**