

## Protecting wetlands

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Some branches of science, notably ecology and allied specializations are often perceived as 'anti-development' and detrimental to the overall growth and welfare of human society. Those working on saving endangered species or the free-ranging animals are worse-off, being viewed with suspicion and generally considered a nuisance. Discussions and negotiations with the establishment on conservation issues often end on a condescending note. In such instances, the old fable of King Bruce of Scotland who inspired by a spider, 'tried and tried until he succeeded' provides the much required solace. In this scenario, when collective action, initiated, supported and furthered by a longitudinal research programme culminates in desired action, and also translates into collateral initiatives, it is important that the process be shared.

A large part of south Chennai was historically a flood plain as evidenced by the soil type of the region, which is described as recent alluvium and granite gneiss<sup>1</sup>. Spread over 50 sq. km, it comprised of a large marsh (Pallikaranai marsh), smaller satellite wetlands and large tracts of pasture land. Locally known as Kaiveli (a generic Tamil name for marshes and swamps), the Pallikaranai marsh drained about 250 sq. km. The numerous smaller wetlands that surrounded the marsh served as the only source of irrigation for the area, which thrived on paddy cultivation. This gave the marsh a legendary status since the villages did not have wells or dug-out ponds, which are the norm in the northern districts of Tamil Nadu (TN). Many contend that the first known manipulation of this system, which is part of the Coromandel Coast, was the laying of the Buckingham Canal. Devised as a navigation canal in 1806, of 421.55 km length, that connected Pedda Ganjam in Andhra Pradesh (AP) and Marakanam in TN, the canal served the primary purpose of ferrying salt. It is not well known that the canal was under private ownership and was then called the Cochrane Canal. In 1837, the Canal was taken over by the East India Company and renamed as the Government East Coast Canal. In 1876, it was rechristened the Buckingham Canal<sup>2</sup>.

The Buckingham Canal was devised as a salt water canal, tidal to a great extent in those parts where the river bars are open and utilized the numerous estuaries and backwaters along the East Coast.

The city of Chennai due to its immediate proximity to the neighbouring state of AP in the north, can expand only towards the west and south. South Chennai hosts a number of educational and research institutions, and hence is a natural choice to develop an Information Technology Corridor. As the city expanded rapidly, the Pallikaranai marsh was fragmented and large parts of the same were reclaimed to be developed as residential and rehabilitation areas. Despite protests, this was not viewed as undesirable because, in accordance with the rather outdated means of land classification that is followed in TN, the marsh was designated a wasteland. The State Government therefore deemed it fit to utilize this marsh for urban development. Amongst others, allotments were made to the Mass Rapid Transport System of the Ministry of Railways, the National Institute of Ocean Technology, the Chennai Corporation, and the Centre for Wind Energy Technology.

In 2002, the Tamil Nadu Pollution Control Board took a decisive step and commissioned a study to map the extent of the marsh, the available habitat, water zonation and depth, and to enumerate the flora and fauna of the marsh for prioritizing the conservation value. Results indicated that the marsh had lost 90% of its original extent and was spread over only 593 ha. About 274 species of flora and

fauna, dominated by the presence of 106 bird species were identified within the marsh. It was also evident that the marsh was being destroyed because of the following factors: reclamation to establish institutions, using a large portion of the marsh as a garbage dump for south Chennai (Figure 1 *a*) and the disposal of partially treated sewage. Water quality analysis within the marsh and the adjoining water bodies showed the presence of mercury, lead and cadmium in quantities that were four times the permissible levels. Compounding this situation was the free-for-all dumping by small and medium industries (Care Earth, unpublished report) (Figure 1 *b*).

A conscious decision was taken by the Tamil Nadu Pollution Control Board to hold a series of meetings at various levels with the stakeholders to engage them, and secondly, to place the results of the study in public domain. This led to unprecedented interest amongst many in Chennai, but it was also interestingly labelled by some as being esoteric and whimsical. The floods of 2002 (Figure 1 *c*) that inundated all the residential areas adjoining the marsh soon changed the overall perspective. Protection of the marsh became peoples' agenda and a forum called the Save Pallikarnai Marsh Forum was formed. Led by resident welfare associations, the forum held a series of negotiations with the Government on the issue of protecting the marsh. Hampered by the fact that a statutory provision for the protection of wetlands is yet to be formulated in India, and also because it was under the category of a

**Table 1.** Plant and animal species richness of the Pallikaranai marsh

Plant/animal groups	Number of species
Plants	114
Butterflies	7
Crustaceans (crabs and prawns)	5
Molluscs (snails and clams)	9
Fishes	46
Amphibians (frogs and toads)	10
Reptiles	21
Birds	115
Mammals	10
Total	337



**Figure 1 a–d.** *a*, The southern end in the garbage dump; *b*, Industrial wastes disposed along the marsh; *c*, Improvised rafts in use during flooding; *d*, Mega constructions that reclaim the marsh.

**Table 2.** Analysis of changes in the area and perimeter of the Pallikarnai marsh since 2003<sup>@</sup>

Segment of the marsh	Year	Area (ha)	Perimeter (km)	Edge development
Garbage dump	2003	50.25*	5.785	2.30
	2005	57.54	6.046	2.24
Area impacted by garbage/sewage	2003	58.75*	—	—
	2005	132.25	—	—
Northern segment <sup>#</sup>	2003	227.00	12.11	2.26
	2005	150.56	7.6	1.74
Southern segment	2003	284.00	9.327	1.56
	2005	279.65	11.8	1.99
Total	2003	620.00	c. 13.0	—
	2005	620.00	c. 13.0	—

Edge development is calculated as the deviation of boundary/perimeter of the segment/polygon from the circumference of a circle that has the same area/extent. It is calculated as  $p/2\sqrt{(3.14A)}$ ; where  $p$  is the perimeter of the segment/polygon in metres,  $A$  the area of the segment/polygon in square metres (1 ha = 10,000 sq. m);  $3.14 = \pi$ .

\*50.25 + 58.75 = 109 ha recommended as the 'critical zone'.

<sup>#</sup>Excludes garbage dump and the impacted area.

<sup>@</sup>The 2003 map was based on details provided by IRS ID PAN + LISS III (March 2001), GPS Field Survey by NIOT (February 2003) and Survey of India toposheet of 1972.

**Table 3.** Subdivision-wise loss of habitat in the marsh

Subdivision	Area (ha) as in 2002–03	Area (ha) as in 2005*	Loss (ha)
1A	50.73	36.8	13.93 (27%)
1B	231.74	113.76	117.98 (51%)
3A1	2.2	2.2	Negligible
3A2	122.38	122.8	Negligible
3A3	168.68	136.8	31.88 (19%)
4A	10.9	10.9	Negligible
4C	6.95	6.95	Negligible
Total	593.58	430.21	163.37 (28%)

\*Estimated using maps and ground verification in 2005.

wasteland, the negotiations soon reached a stalemate. Print and visual media however kept the issue alive. Concurrently, a number of students from varying disciplines undertook a series of studies on the marsh. Responding to public pressure, and repeated flooding of residential areas abutting the marsh, the State Government through the Tamil Nadu Pollution Control Board commissioned a second study with the objective of evolving short and long-term measures for protecting the marsh (Care Earth, unpublished report).

Results on the number of plants and animal groups found within the marsh served to highlight the species richness and diversity (Table 1).

The plant diversity of the marsh is enriched by the presence of at least two species of grasses that are endemic to Peninsular India, viz. *Cynodon barberi* and *Iseilema antheophoroides*. Resident birds like the black-winged stilt, pheasant-tailed jacana, purple moorhen, little grebe, open-billed stork, egrets and grey

herons that were quite abundant during the earlier field studies, were only seen in smaller numbers.

The study also analysed the changes that occurred within the marsh (Table 2). It is also important to mention in this context that as the demand for protecting the marsh gained momentum, degradation and land-grabbing hastened rather rapidly (Figure 1d). This period also witnessed claims by erstwhile minor rulers and zamindars over the marsh.

The extent of the marsh to be protected that was recommended by the 2002 study was within Survey No. 657 (subdivisions 1A, 1B, 3A1, 3A2, 3A3, 4A and 4C) covering an area of 593.58 ha. Table 3 summarizes the subdivision-wise loss of habitat (within Survey No. 657) in the marsh.

The rapid decimation of the marsh was viewed as a matter of great concern, and a Local Area Environment Committee was formed on 20 March 2006 to expedite the protection process. A High Level Committee chaired by the Chief Secretary

(25 October 2005) was also constituted to take remedial measures and recommend measures for mitigating the problem. After a series of deliberations, on 9 April 2007, 317 ha of the marsh was declared a Reserve Forest. This excludes the area that is being used as the garbage disposal site, which continues to be a matter of serious concern. The silver lining of course is the first positive response by the Government.

1. International Map of the Vegetation: Madras, ICAR and French Institute, 1962.
2. Francis, W., Nicholson, F., Middlemiss, C. S. and Barbi, C. A., *Gazetteer of South India. Vol. 1*, Millat Publishers, New Delhi, reprinted in 1988.

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