



†Mangroves of Poyya backwaters of Thrissur district, Kerala, India

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Abstract

The present investigation is on the physico - chemical parameters and the diversity, distribution and abundance of mangrove vegetation at Poyya backwaters of Thrissur district, Kerala, India. The hydrographic parameters fluctuated with sites. The temperature ranged from 25 to 31°C and total hardness from 30 to 52 mg l⁻¹. The pH of water was generally alkaline and the values varied from 7.03 to 7.34. The salinity of water ranged from 19.88 to 31.24‰ during premonsoon season and 19.88 to 28.4‰ during monsoon season. During the period of study four true mangroves belonging to four genera were observed from three sites. The true mangrove species were *Aegiceras corniculatum* (L.) Blanco, *Avicennia officinalis* L., *Acanthus ilicifolius* L. and *Excoecaria agallocha* L. *Acanthus ilicifolius* L. was the dominant and abundant plant followed by *Avicennia officinalis* L. The mangrove associates were *Derris uliginosa* (Roxb.) Benth, *Clerodendron inerme* (L.) Gaertn, *Sphaeranthus indicus* L., *Achrostichum aureum* L., *Mariscus javanicus* (Houtt.) Merr. & Metcalfe and *Cyperus* species. The diversity index of the mangrove and associated flora in Poyya backwaters was 3.1 in site 3 and 2.4 in sites 1 and 2.

Keywords: Mangroves, Poyya backwaters, hydrographic parameters, diversity index

Introduction

Mangroves are biologically rich coastal ecosystem, mostly found along the saline marshes near seashore and backwaters in tropical and subtropical regions. Kerala has 590 km long coastline constituted by long stretches of backwaters with mangroves and species of diverse ecology. The hydrography of the backwaters of Kerala was reported by Menon *et al.* (2000), Suma and Joy (2003), Mukundan and Thomas (2004) and Unnithan *et al.* (2005). The mangrove vegetations of Kerala cover an area of 1671 hectares and are found as discrete and isolated patches in different parts of the state (Basha, 1991). Kerala mangroves are becoming endangered due to the lack of scientific attention (Sunilkumar, 2002).

The area of estuaries and backwaters in Thrissur district of Kerala is estimated as 1,409.7 ha. (KSLUB, 1993). Chettuva, Kodungallur and Azhikode are the

major estuaries in Thrissur district. The mangroves which were restricted to an area of hardly 25 ha in Thrissur district (Mohanam, 1997), had shrunken drastically to 5 ha and is at present represented only as relicts at Chettuva (Kumudranjan and Rathindranath, 1999). We conducted a survey on the distribution of mangroves in Poyya backwaters in Thrissur district.

Material and Methods

Poyya backwaters is located between 10° 13' N and 10° 15' N lat. and 76° 14' E and 76° 17' E long. The study was conducted at three sites namely Koshavankunnu (S₁), Chenthurutti (S₂) and Poyya (S₃) in Poyya backwaters (Fig.1) during April - August 2008.

Monthly surface water samples were collected and temperature, conductivity and pH were measured using standard instruments *viz.*, centigrade

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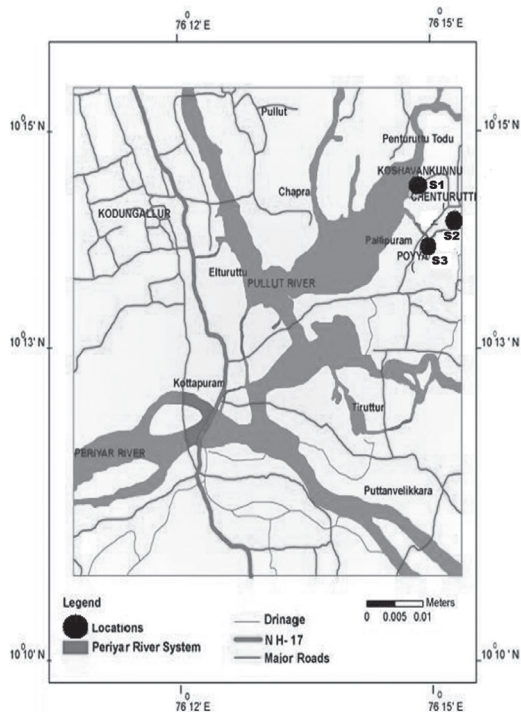


Fig. 1. Study area showing sampling sites

thermometer, conductivity meter and pH pen, respectively. Dissolved oxygen (DO) was determined by Winkler's method, total hardness by EDTA titrimetric method, salinity from the values of chlorinity and total alkalinity, acidity, calcium, magnesium and biological oxygen demand (BOD) were determined by following standard methods

(APHA, 1998). Mangrove species were identified following Gamble and Fischer (1935). During August 2008 ten transects of six meter length were selected at random at the three sites. The vegetation in the selected area was estimated by line transect method and the diversity index was calculated using Shannon diversity index (Trivedi *et al.*, 1998).

Results and Discussion

Monthly fluctuations of hydrographic parameters are given in Fig. 2a to 2k. Except pH, hardness and calcium, all the other monthly values overlapped between the sites. The surface water temperature varied marginally between 30 and 31°C during pre-monsoon, and from 25 to 29°C in monsoon. The water was alkaline and the pH ranged from 7.03 to 7.34. Total hardness fluctuated from 30 to 50 mg l⁻¹ during premonsoon and from 30 to 52 mg l⁻¹ in the monsoon season. Salinity showed variation from 19.88 to 31.24‰ during premonsoon and from 19.88 to 28.4‰ in monsoon. Mukundan and Thomas (2004) noticed low salinity during monsoon and nearly seawater condition in premonsoon in the Kodungallur backwaters. Salinity affects the growth of mangroves and associated flora (APHA, 1998).

The hydrographic parameters in Poyya backwaters are influenced by the influx of river water, tidal intrusion of seawater and rainfall. The analysis of variance (two-way ANOVA) showed that the parameters investigated varied significantly within and between stations (Table 1). The monthly

Table 1. Analysis of variance (two-way ANOVA) of hydrographic parameters

Sl. No.	Parameters	Monthly fluctuations		Seasonal fluctuations	
		Within stations	Between stations	Within stations	Between stations
1	Temperature	0.00075 ***	0.40960	0.01092 *	0.42200
2	Conductivity	0.50489	0.00043 ***	0.50885	0.02679 *
3	pH	0.21150	0.00001 ***	0.19461	0.02393 *
4	Acidity	0.00102 **	0.01090 *	0.01586 *	0.06859
5	Alkalinity	0.00460 **	0.60115	0.16540	0.25524
6	DO	0.00058 ***	0.00759 **	0.04542 *	0.22567
7	BOD	0.75972	0.01018 *	0.51849	0.30441
8	Total Hardness	0.00016 ***	0.00000 ***	0.02040 *	0.00033 ***
9	Calcium	0.94780	0.00016 ***	0.97793	0.09399
10	Magnesium	0.24661	0.00015 ***	0.65264	0.07762
11	Salinity	0.01237 *	0.83123	0.29587	0.85874

* Significant ($p < 0.05$), ** Significant ($p < 0.01$), *** Significant ($p < 0.001$)

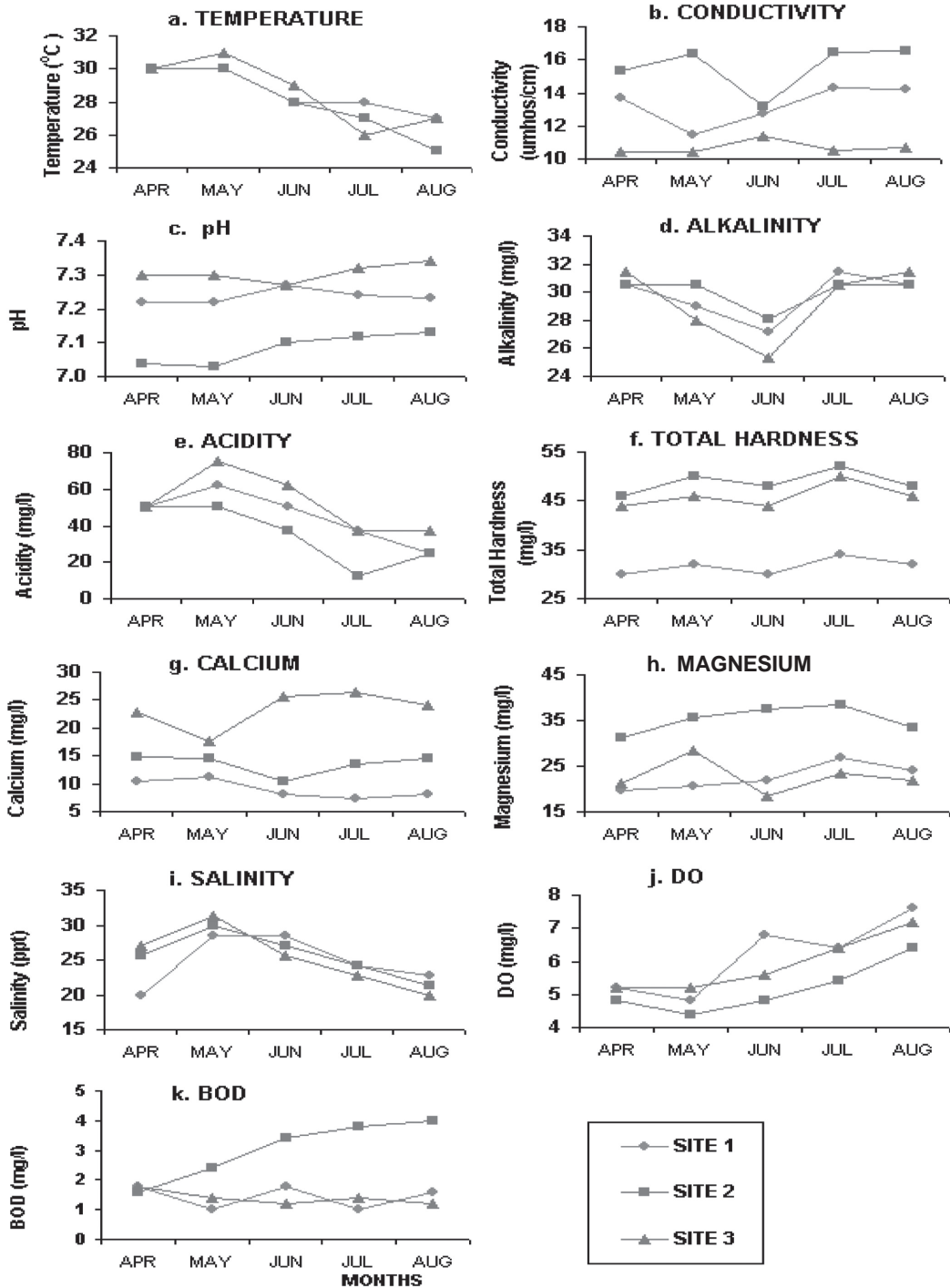


Fig. 2. Monthly fluctuations of hydrographic parameters during April-August 2008 at Poyya backwaters

variations of temperature, DO, total hardness, acidity, alkalinity and salinity were significant within stations. The monthly variations of conductivity, pH, total hardness, calcium, magnesium, DO, acidity and BOD were significant between stations. The seasonal variations of temperature, acidity, total hardness and DO were significant within stations and the total hardness, conductivity and pH were significant between stations.

Four true mangrove species belonging to four genera were recorded in Poyya backwaters. They were *Acanthus ilicifolius* L. (Acanthaceae),

Excoecaria agallocha L. (Euphorbiaceae), *Aegiceras corniculatum* (L.) Blanco (Myrsinaceae) and *Avicennia officinalis* L. (Avicenniaceae). The mangrove associates were *Derris uliginosa* (Roxb.) Benth (Papilionaceae), *Clerodendron inerme* (L.) Gaertn (Verbenaceae), *Sphaeranthus indicus* L. (Asteraceae), *Achrostichum aureum* L. (Pteridaceae), *Mariscus javanicus* (Houtt.) Merr. & Metcalfe (Cyperaceae) and *Cyperus* sp. (Cyperaceae).

The quantitative estimation of vegetation in Poyya backwaters by line transect analysis (Table 2) showed that *Acanthus ilicifolius* L. was

Table 2. Quantitative estimation of vegetation in Poyya backwaters

Sl. No.	Name of species	Site	F	R.F	D	R.D	A
1	<i>Acanthus ilicifolius</i> L.	1	100	18.52	3.3	15.00	3.30
		2	90	16.98	13.9	33.17	15.44
		3	90	10.84	10.6	27.75	11.78
2	<i>Aegiceras corniculatum</i> (L.) Blanco	1	-	-	-	-	-
		2	-	-	-	-	-
		3	80	9.64	2.4	6.28	3.00
3	<i>Avicennia officinalis</i> L.	1	90	16.67	2.6	11.82	2.89
		2	100	18.87	6.5	15.51	6.50
		3	100	12.05	5.1	13.35	5.10
4	<i>Excoecaria agallocha</i> L.	1	-	-	-	-	-
		2	-	-	-	-	-
		3	90	10.84	2.5	6.54	2.78
5	<i>Achrostichum aureum</i> L.	1	100	18.52	4.3	19.55	4.30
		2	80	15.09	8.2	19.57	10.25
		3	70	8.43	2.8	7.33	4.00
6	<i>Clerodendron inerme</i> (L.) Gaertn	1	70	12.96	2.8	12.73	4.00
		2	90	16.98	7.2	17.18	8.00
		3	100	12.05	5.1	13.35	5.10
7	<i>Mariscus javanicus</i> (Houtt.) Merr. & Metcalfe	1	-	-	-	-	-
		2	80	15.09	2.2	5.25	2.75
		3	90	10.84	3.1	8.12	3.44
8	<i>Cyperus</i> sp.	1	100	18.52	7.5	34.09	7.50
		2	-	-	-	-	-
		3	60	7.23	2.1	5.50	3.50
9	<i>Derris uliginosa</i> (Roxb.) Benth	1	80	14.81	1.5	6.82	1.88
		2	90	16.98	3.9	9.31	4.33
		3	80	9.64	3.0	7.85	3.75
10	<i>Sphaeranthus indicus</i> L.	1	-	-	-	-	-
		2	-	-	-	-	-
		3	70	8.43	1.5	3.93	2.14

F = Frequency (%); R.F = Relative frequency; D = Density (total no. of individuals of species / no. of transects); R.D = Relative density; A = Abundance (total no. of individuals of species / no. of transects in which the species occurred).

Table 3. Distribution of the mangroves in Poyya backwaters

Sl. No.	Name of species	Family	Distribution of mangroves		
			S1	S2	S3
1	<i>Acanthus ilicifolius</i> L.	Acanthaceae	+	+++	+++
2	<i>Aegiceras corniculatum</i> (L.) Blanco	Myrsinaceae	-	-	+
3	<i>Avicennia officinalis</i> L.	Avicenniaceae	+	++	++
4	<i>Excoecaria agallocha</i> L.	Euphorbiaceae	-	-	+

+++ Abundant; ++ Frequent; + Rare; - Absent

Table 4. Distribution of mangrove associates in Poyya backwaters

Sl. No.	Name of species	Family	Distribution of mangrove associates		
			S1	S2	S3
1	<i>Achrostichum aureum</i> L.	Pteridaceae	++	+++	++
2	<i>Clerodendron inerme</i> (L.) Gaertn	Verbenaceae	+	+++	++
3	<i>Mariscus javanicus</i> (Houtt.) Merr. & Metcalfe	Cyperaceae	-	+	+
4	<i>Cyperus</i> sp.	Cyperaceae	+++	-	+
5	<i>Derris uliginosa</i> (Roxb.) Benth	Papilionaceae	+	+	+
6	<i>Sphaeranthus indicus</i> L.	Asteraceae	-	-	+

+++ Abundant; ++ Frequent; + Rare; - Absent

less abundant in S₁, but was abundant in S₂ and S₃. Thick vegetation of *A. ilicifolius* L. was noted at S₂. *Avicennia officinalis* L. was rare at S₁ and frequent at S₂ and S₃. *Aegiceras corniculatum* (L.) Blanco and *Excoecaria agallocha* L. were rare in S₃ and were absent at S₁ and S₂ (Table 3). The present status of distribution of mangrove associates in Poyya backwaters is presented in Table 4. The diversity index of the mangrove and associated flora in Poyya backwaters was 3.1 in site 3 and 2.4 in sites 1 and 2.

Unni (2009) recorded 15 true mangroves from Kerala. *Aegiceras corniculatum* (L.) Blanco was reported from Kasaragod, Kollam, Malappuram, Kozhikode and Aleppy, but not from Thrissur district (Sasidharan, 2004). *A. corniculatum* (L.) Blanco is the most abundant species in Pappinisser mangal forest of Kannur district (Khaleel, 2005) and was not found in Vypeen and Panambukad islands of Cochin backwaters (Suma and Joy, 2003). *Acanthus ilicifolius* L. is distributed in all the backwaters in Kerala. *Excoecaria agallocha* L. was rare and *Aegiceras corniculatum* (L.) Blanco and *Avicennia officinalis* L. were occasionally found in Chettuvai, Thrissur district (Vidyasagar and Gopikumar, 2006). *Acanthus ilicifolius* L., *Excoecaria agallocha* L. and *Avicennia officinalis*

L. were distributed all along Kerala coast and *Aegiceras corniculatum* (L.) Blanco was rare and found along the Travancore coast (Unni, 2009).

Excoecaria agallocha L. and *Aegiceras corniculatum* (L.) Blanco were found in S₃ and this area was highly saline during premonsoon which indicates their preference to higher salinity conditions. The present study shows that hydrographic parameters especially total hardness, pH, calcium and salinity have an important role in determining mangrove species distribution in Poyya backwaters.

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