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Distribution of Macrophytes in Chilika

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Abstract:- Aquatic macrophytes play an important role in structuring communities in aquatic environment. These plant provide physical structure ,increase habitat complexity and heterogeneity and affect various organisms like invertebrates, fish and water birds. Owing to their high rate of biomass production macrophytes have been primarily characterized as an important food source for aquatic organisms ,providing both living (grading food webs) and dead organic matter.(detivores food webs). Diversityoafmacrohytes and macroalgaein Chilika lake are very high exhibiting saptio-temporal variation in four ecological sectors. Seagrass meadows provide important ecosystem services in the form of nutrient cycling, enhancing coral reef fish productivity for thousands of fish ,birds and invertebrate species. The aquatic vascular plants occurring in Chilikacan be classified in to four broad groups i.e. emergent, rooted floating-leaved, submerged, and free floating. Distribution of macrophytes with a special reference to Seagrass were studied in 16 sampling station covering a all the major ecological sector i.e, Northern ,Central, Southern and Outer Channel to assess the spatial and seasonal variability of macrophytes. Collection, Preservation and Herbarium preparation methods were done in different sectors and seasons. A distributional record of 66species including five species of seagrass were found. During the present study, five species of seagrassesi.e, Haloduleuninervis, Halodulepinifolia, Halophilaovalis,Halophilaovataand Halophilabeccariiwere recorded from Chilika through extensive survey.

Keywords:- *Haloduleuninervis, Halodulepinifolia, Halophilaovalis, Halophilaovata and Halophilabeccarii, macrophytes, Northern , Central, Southern and Outer Channel.*

I. INTRODUCTION

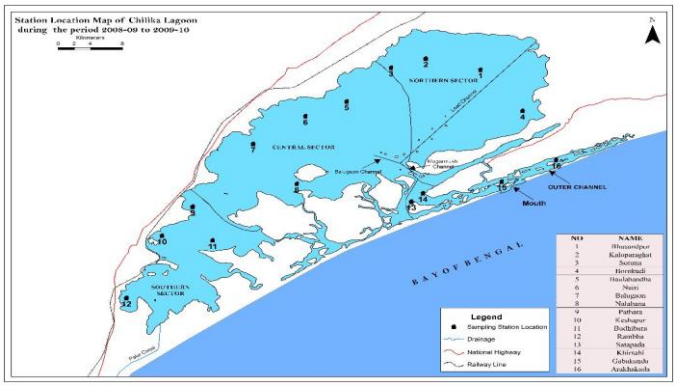
Macrophytes are defined as aquatic photosynthetic organism ,large enough to see with naked eyes that grow permanently or periodically submerged below, floating on , or growing up through the water surface. Aquatic macrophytes are represented in seven plant divisions: Cyanobacteria, Chlorophyta, Rhodophtya, Xanthophyta ,Bryophyta, Pteridophtya and Spermatophtya. Studded like a zircon on the golden stretch of eastern coast of Odisha in India ,Chilika lagoon is an unique assemblage of marine , brackish and fresh waters ecosystem with estuarine characters. It is a hotspot of biodiversity as it support many rare, endangered and endemic species of plants and animals.. The lagoon is an avian wonderland and a staggering and wintering for a large number of bird species. Diversity of macrophytes and macroalgae in Chilika lake are very high exhibiting spatio-temporal variation in four ecological sectors ,maximum diversity and biomass existing in the riverineinflow influenced northern sector. Mostly the green macroalgae group form the preferred food item for most of the mullet species. Recent scientific reviews have shown that seagrassherbivory is a highly important link in the food chain with hundreds of species feeds on seagrasss.

II. STUDY SITE

Chilika is situated between19^{0}20·& 19^{0}54·N latitude & 85^{0}6 & 85^{0}35E longitude along the seacoast of Odisha. Chilika is the largest brackish water lagoon of the country & its connected to the Bay of Bengal through an outer channel. The lagoon was broadly divided into four ecological sectors, i.e Northern, Central ,Southern,& Outer channel. Each sectors were again divided into four monitoring stations which were fixed by GPS, taking it to a total of 16stations.

Sector	Sl. no	Station name	Longitude	Latitude
Northern sector	1	Bhusandapur	85.47483	19.82659
	2	Kaluparaghat	85.42074	19.85990
	3	Sorana	85.38287	19.83289
	4	Borokudi	85.52532	19.76628
Central Sector	5	Baulabandha	85.33148	19.79868
	6	Nairi	85.29993	19.77978
	7	Balugaon	85.24403	19.74467
	8	Nalabana	85.28911	19.69426
Southern Sector	9	Pathara	85.17370	19.62765
	10	Keshpur	85.15206	19.58714
	11	Budhibara	85.18903	19.59344
	12	Rambha	85.13132	19.53042
Outer channel	13	Satapada	85.43787	19.66815
	14	Khirisahi	85.49467	19.66185
	15	Gabakunda	85.52983	19.68166
	16	Arakhkuda	85.58933	19.70506

Table 1. Longitude & Latitude Extension of my monitoring study stations



III. MAP SHOWING SIXTEEN MONITORING STATIONS IN DIFFERENT SECTOR

During the present study, extensive survey was carried out for exploring the macrophtyes within the water spread.

Assessment of biological diversity of the angiospermicplants, Mapping& monitoring of the Invasive species, exploration of seagrass meadows & macro algae was carried out. Phtyoplanktons were not included in this study.

IV. MATERIALS AND METHODS

A. Field and Herbarium Methods

Each Seagrass was collected in its flowering or at vegetative stage, field notes on its locality, habitat, collector's name, collection number, uses and plant details were maintained in field notes. The specimen were brought to the laboratory and were identified by studying morphological Characters by following State floras, Monographs, or by matching with herbarium available in India(Central National Herbarium, Kolkata) and some with consultation with state taxonomist. During monitoring information on soil types, depth and salinity were also gathered to assess the environmental conditions for the growth of seagrasses and also local uses and threats to the seagrasses meadows were studied through visual observations and interacting with local peoples.

B. Identification & Nomenclature

The identity of the plant was determined with the help of artificial taxonomic keys provided in 'The Botany of Bihar & Orissa' (Haines,1921-1925), Its 'Supplements', Mooney,1950,The Flora of Orissa (saxena& Braham,1994-96),other floras, monographs & taxonomic revisions using the diagonistic characters in the phtyogeography of the plant. The correct name was ascertained to each taxon as per the rules provision of the recent International Code of Botanical Nomenclature(ICBN).The correct name is followed by reference to " The Flora of Odisha"(Saxena&Brahmam) & the collection number of specimens.The important synonyms(s) occurring in the Botany of Bihar & Orissa and its supplement have been given to correct it to correct name.

C. Enumeration of Taxa

In the enumeration, the families have been arranged according to modified Benthem & Hokers system of classification(1862-1883) as done in the Central National Herbarium, Botanical Survey of India, Calcutta (CAL) & elsewhere.

D. Collection & Identification of macro-algae

The macroscopic algal samples were collected from samplingstations located in the four ecological factors of the lagoon in thirty day intervals. During collection trips macro algal samples were preserved in lugols solution immediately after collection.

V. RESULTS AND DISCUSSION

The aquatic vascular plants occurring in Chilika can be classified in to four broad groups i.e. emergent, rooted floating-leaved, submerged, and free floating. All the four groups were encountered during the course of the present study. Emergent macrophytes are mostly perennial

Fig 1:- Phragmiteskarka formations in Northern sector Schoenoplectuslittoralis along muddy shore, Eichhorniacrassipes in Northern sector, Seagrass meadow in outer channel

Emergent macrophytes are mostly perennial higher plants growing on periodically inundated or submerged soils with their basal portions submerged in water and tops above the water level. Their root system is well developed to provide strong anchorage with the substratum to withstand the wind and wave action in the shallow water zone. The emergent species like Phragmiteskarka, Schoenoplectuslittoralis, Schoenoplectusarticulatus, Typhaangustata, and Cyperusplatystylis, Cyperuscompressus were common in eulittoral zone of the northern sectorfrom Kalupadaghat to Mangalajodi, extending up to the river confluence point of Daya, Bhargabi and Luna. The western river confluence points like Kanshari and Salia also support the luxuriant growth of a number of emergent macrophytes. Rooted floating-leaved macrophytes are the plants that are rooted at the bottom with leaves floating on the surface of the water. Floating leaves are attached to roots or rhizomes with a flexible, tough stem and

in many cases by a leaf stalk. This group of aquatic plants were observed to be restricted to the northern sector of the lagoon, which remain predominantly fresh for more than ten months. The characteristic species in the shallow sheltered zones of northern sector from Mangalajodi to Kalupadaghat, where the wind action is minimum were .

- *Nymphaeapubescens, Nymphaeanauchali, Nymphoideshydrophylla and Nymphoides*

indica. The situation prevails up to four kilometres towards Sorono where species of both Nymphaea and Nymphoides occur in profusion. Species of Nymphoides are also fairly abundant from Borkudi up to the river confluence points of Daya and Bhargavi. These species are ephemeral in nature and with the rise in water level by more than a meter during July-October, they wither and disappear. Once more they make their appearances in the post-monsoon seasons starting from early October. Submerged macrophytic vegetation of the lagoon was much diversified and well distributed in all the four ecological sectors. In the northern sector, which is predominantly a fresh water zone, the submerged species encountered were Hydrillaverticillata, Aponogetannatans, Potamogetonnodosus, Potamogetonoctandrus, Potamogetonpectinatus, Utricularіaaurea, Najasminor, Najasgraminea, Najasindica, and few of inland fresh waterbodies. Potamogetonpectinatus, Najasgramineaother aquatic species characteristics alongwith the seagrass species like Halophilabeccarii, Halophilaovata, Halophilaovalis,

Haloduleuninervis and Halodulepinifolia were the dominant species of the central sector and their occurrence was recorded from Nalabana bird sanctuary and the creeks of Krushna Prasad island with sandy substratum. Table showing some sectorial distribution of Macrophytes in Chilika lagoon.

	Name of the species	Northern Sector				Central Sector				Southern Sector				Outer Channel			
		St 1	St 2	St 3	St 4	St 5	St 6	St 7	St 8	St 9	St 10	St 11	St 12	St 13	St 14	St 15	St 16
1	Chaetomorphalinum	+	+	+	_	-	+	+	+	-	-	+	+	-	-	-	-
2	Entermorphaintestinalis	-	-	-	-	+	+	+	-	-	-	+	+	-	-	-	-
3	Charabraunii	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
4	Gracillariaverrucosa	-	-	-	-	-	-	+	+	+	-	+	+	-	-	-	-
5	Gracilarialichenoides	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-
6	Polysiphoniasubtillisima	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-
7	Azollapinnata	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Blyxaechinosperm	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Cressacretica	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Cynodondactylon	+	+	+	+	-	-	+	+	-	-	+	+	-	+	+	-
11	Digitarialongiflora	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
12	Marsileaquadrifolia	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Salviniacuculata	+	+	_	-	-	-	-	-	-	-	-	-	-	-	-	-
`14	Alternantherasessilis	+	+	_	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Amischophacelusaxillaris	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Arundodonax	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Echinocholastagnina	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Eleocharisdulcis	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Fimbristyliscymosa	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Heliotropiumcurassavicum	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Monochoriahastata	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Myriostachyawightiana	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Paspallumdistichum	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Phragmiteskarka	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-
25	Polygonumflaccidium	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Schoenoplectusarticulatus	+	+	+	_	-	-	-	-	-	-	-	-	-	-	-	-
27	Schoenoplectuslittoralis	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
28	Sesuviumporstulacastrum	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Typhaangustata	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Vetiverazizanioides	+	+	_	-	-	-	-	-	-	-	-	-	-	-	-	-
31	Hygroyzaaristata	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	Ipomoea aquatica	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
33	Lemna minor	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Ludwigiaperenis	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Nymphoideshydrophylla	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
36	Nymphoidesindica	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
37	Nymphaeanouchalli	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2. Sectorial distribution of Macrophtyes in Chilika Lagoon

Free floating hydrophytes, which typically float on or just under the water surface with their roots in the water, are observed to be dominant in the fresh water zone of the northern sector and the river confluence points in the central sector. Eichhorniacrassipes. The Eichhornia were observed to decompose with the increase in the salinity level of the lagoon. Pistiastratiotes, Salviniacucullata and small free-floating ones like Azollapinnata, Spirodelapolyrhiza, Lemnaminor were the dominant species. Interestingly, Azollapinnata which finds its way in to the lagoon from the paddy fields grow and form thick mat near Kalupadaghat and Mangalajodi during post monsoon months but it gradually disappears as the salinity level of this sector improve from the month of April onwards.

VI. CONCLUSION

Wetlands are one of the most important ecosystem on the earth surface. They are described as the ‘’Kidney” because of the functions they perform both hydrologically, biochemically and as “supermarkets” due to its rich

biodiversity with extensive foodweb it contains. The importance of Wetlands is gradually realized all over the world. Chilika lagoon is an assemblage of marine, brackish, & fresh water ecosystem with rich diversity of animals & plants. This highly productive ecosystem supports the livelihood of more than two lakhs people who live in around the lagoon. A clear graphical pictures should be drawnbetween the different components of the ecosystem for effective management of this ‘’ecowonder’. All four groups of aquatic vascular plants i.e, emergent, rooted, floating, submerged and free floating were encountered during the course of the study period.The emergent species like Phragmiteskarka, Schoenoplectus articulates, Typhaangustaand Cyperuscompressusetc were quite common in eulittorial zone of the northern sector.

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