COMPOSITION AND DISTRIBUTION OF SUBMERGED AQUATIC VEGETATION IN CHILIKA LAGOON

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Abstract : This study has been undertaken to investigate the composition of submerged aquatic vegetation and their distributional pattern in Chilika lagoon, one of the hot spot of biodiversity, supporting many endemic and endangered species. Submerged aquatic vegetation are highly essential for an estuarine like Chilika like trees to a forest. SAV supports the health of these ecosystems by generating food and habitat for waterfowl, fish, shellfish, and invertebrates; adding oxygen to the water column during photosynthesis; filtering and trapping sediment that otherwise would bury benthic organisms and cloud the water column; inhibiting wave action that erodes shorelines; and absorbing nutrients, such as nitrogen and phosphorus, that otherwise could fuel the growth of unwanted planktonic algae. Therefore they act as good indicator of health of lake ecosystem. The most dominant SAV species in Chilika is *Hydrilla verticillate*. For the very purpose their composition and distribution was studied for six months i.e , from oct18 to april 19.

IndexTerms– Submerged Aquatic Vegetation, Chilika, *Hydrilla verticillate,* benthic organisms, good indicator

Introduction

Submerged aquatic vegetation includes both flowering and non-flowering plants. It includes macroalgae, seagrasses and hydrophytes. They are important components in regulating the shallow estuarine wetland such as Chilika. Chilika lagoon is an unique assemblage of fresh ,brackish and saline water. It is a hot spot of biodiversity. Chilika was included as one of the first two wetlands of India under the Ramsar convention in 1981 based on its unique biodiversity The plants that comprise these communities are distributed in shallow water areas along the Chilika from poly haline to freshwater areas according to their individual salinity tolerances. Species like Hydrilla grow in fresh water, Halophila grow in saline water and many other SAV such as Potamogeton grow in both low salinity and freshwater areas. Now almost 30% of aquatic grasses worldwide are either lost or becoming vulnerable and time has come for their protection and conservation. In shallow temperate lakes many ecological processes depend on submerged macrophytes. In subtropical and tropical lakes, free-floating macrophytes may be equally or more important. They are highly essential to the health of an estuary.

Research Methodology

Chilika is situated between$19^0$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, and Outer channel. Each sectors were again divided into four monitoring stations which were fixed by GPS, taking it to a total of 16 stations.

Table I:Longitude & Latitude Extension of monitoring study stations

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

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

The present investigation was confined to distribution of SAV, composition and its distribution in the lagoon.

Plant collection& preservation method

The lagoon was broadly divided into four ecological sectors and field trips were planned in such a manner that every part of the area can be explored within the stipulated time frame. Regular and frequent trips were made in different seasons of the year to various localities. Each trip was of several days duration. Correct field notes were recorded on the spot that include locality, habitat, collector'sname, collection number, date, and local names. Every attempt was made to obtain phenological data like flowering and fruiting time.

Separate species, genus and family covers were used for filling several specimens of a single species, species under a genus and a genera under a family respectively. The collections were then incorpated into the Herbarium. The arrangement of families is as per the revised Benthem and Hooker's (1862-1883) system of classification as followed in the Central National Herbarium,Calcutta..

Identification & Nomenclature

The identity of the plant was determined with the help of artificial taxonomic keys provided in 'The Botany of Bihar and Orissa'(Haines,1921-1925),Its 'Supplements',Mooney,1950,The Flora of Orissa (saxena & Braham,1994-96),other floras, monographs & taxonomic revisions using the diagnostic characters in the phtyogeography of the plant. At times, botanical descriptions available in these treatises were referred to for confirmation.Some doubtful specimen were taken to Central National

Herbarium,Calcutta(CAL) and were matched with authentic materials available there. For certain difficult specimen ,taxonomic experts were consulted.

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.

Results and Discussion:

Submerged aquatic vegetation of the lagoon was much diversified and well distributed in all the four ecological sectorsIn the northern sector, which is predominantly a fresh water zone, the submerged species encountered were *Hydrilla verticillata, Potamogeton pectinatus, Utricularia aurea, and, Ceratophyllum demersus*

Table-II Sector wise distribution of Submerged Aquatic Vegetation

Sl.no	Name of Species		Northern Sector			Central sector			
		St-1	St-2	St-3	St-4	St-5	St-6	St-7	St-8
1	Chaetomorpha linum	+	+	+	_	-	+	+	+
2	Entermorpha intestinalis	-	-	-	-	+	+	+	-
3	Chara braunii	-	+	-	-	-	+	-	-
4	Gracillaria verrucosa	-	-	-	-	-	-	+	+
5	Polysiphonia subtillisima	-	-	-	-	-	-	+	-
6	Ruppia maritima	-	-	-	-	+	-	+	-
7	Utricularia aurea	+	+	+	-	-	-	-	-
8	Vallisineria natans	+	+	+	-	-	-	+	-
9	Ceratophyllum demersus	+	+	+	+	+	+	-	-
10	Halophila beccari	-	-	-	-	-	-	-	+
11	Halophila ovalis	-	-	-	-	-	-	-	+
12	Halophila ovate	-	-	-	-	-	-	-	+
13	Halodule uninervis	-	-	-	-	-	-	-	-
14	Halodule pinifolia	-	-	-	-	-	-	-	-
15	Hydrilla verticillate	+	+	+	+	+	+	+	+
16	Potomageton crispus	+	+	+	-	-	-	-	-

SL.NO	**Name of the species**	**Southern Sector**				**Outer Channel**			
		St-9	St-10	St-11	St-12	St-13	St-14	St-15	St-16
1	Chaetomorpha linum	-	-	+	+	-	-	-	-
2	Entermorpha intestinalis	-	-	+	+	-	-	-	-
3	Chara braunii	-	-	-	-	-	-	-	-
4	Gracillaria verrucosa	+	-	+	+	-	-	-	-
5	Polysiphonia subtillisima	-	-	+	+	-	-	-	-
6	Ruppia maritima	+	+	+	+	-	-	+	-
7	Utricularia aurea	-	-	-	-	-	-	-	-
8	Vallisineria natans	-	-	-	-	-	-	-	-
9	Ceratophyllum demersus	-	-	-	-	-	-	-	-
10	Halophila beccari	+	+	+	+	+	+	+	-
11	Halophila ovalis	-	+	+	+	+	+	+	-
12	Halophila ovate	-	-	-	-	-	+	+	-
13	Halodule uninervis	-	-	-	-	-	+	-	+
14	Halodule pinifolia	-	-	-	-	-	+	-	+
15	Hydrilla verticillate	-	-	-	+	-	-	-	-
16	Potomageton crispus	-	-	-	-	-	-	-	-

+ = Present, - = Absent

In the central sector of the lagoon luxuriant bed of submerged aquatic vegetation bed was found , which was composed of *Halophila ovate, Halophila ovalis* and *Halodule uninervis* in association with the *Ruppia maritime.* The Nalabana island and the creeks of Krushna Prasad island with shallow water, softbottom and less fluctuation of salinity support very good submerged communities.

The shoreline of the southern sector from village Pathara up to Somolo island supports formation of very good submergd beds formed of *Halodule uninervis* and *Halophila ovalis* in association with the red algae *Gracilaria verrucosa*.

Table III- Frequency of Occurrence of Submerged aquatic Vegetation In Chilika

Sl.No	**Name of the species**	Frequency of occurrence=Number of sites where a species occurred x 100 **=%** Total no of sites
1	Chaetomorpha linum	50
2	Entermorpha intestinalis	31.25
3	Chara braunii	12.5
4	Gracillaria verrucosa	25
5	Polysiphonia subtillisima	18.75
6	Ruppia maritime	43.75
7	Utricularia aurea	18.75
8	Vallisineria natans	25
9	Ceratophyllum demersus	37
10	Halophila beccari	43.75
11	Halophila ovalis	37.5
12	Halophila ovate	12.5
13	Halodule uninervis	12.5
14	Halodule pinifolia	12.5
15	Hydrilla verticillate	56.25
16	Potomageton crispus	18.75

Potamogeton pectinatus, along with the species like *Halophilabeccarii, Halophila ovata, Halophila ovalis, Halodule uninervis* and *Halodule pinifolia* were thedominant species of the central sectorThe SAV were found at their best around calm sheltered areas in the northern sector and in the sandy substratum of southeastern part of the southern sector extending through the creeks of central sector up to the village Arakhakuda of the outer channel..

Northern sector , shows more species diversification in SAV which includes both composition and number than other sectors. which largely remains fresh for 10 months, which may be one of the attribute for the species diversity. The opening of the new mouth i.e, 2.5 km north of the existing one at Arakhakuda , provided stable salinity regime with little fluctuations, improved water clarity, especially in post monsoon ,which is favorable for the growth of submerged vegetation. The most dominant submerged species by occurrence of frequency method, is *Hydrilla verticillate*.

Its frequency of occurrence is more than any species which is nearly 56.25%. It presence is observed in nine stations. It mostly occurred in the Northern and Central sector where salinity is less compared to the southern and Outer channel. The growth of any species is dependent on different hydrological parameters such as salinity , temperature, ph, dissolved oxygen and transparency.

The species of plants recorded from Chilika during the present study, which come under the category of rare or threatened plants is *Halophila beccarii* (Hydrocharitaceae).

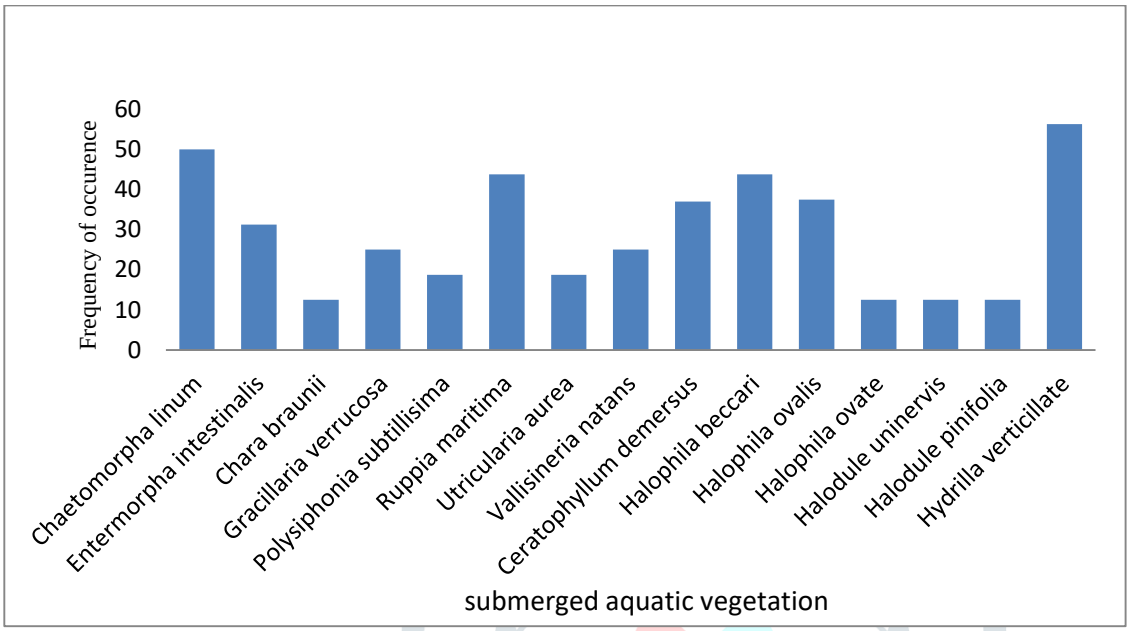

Fig: Graph showing the most dominant SAV species of Chilika

Conclusion:

This present investigation has tried to generate significant database on the distribution pattern and species composition It also tried to provide valuable information on frequency of occurrence, The collective databases serves as a platform for improved understanding of submerged aquatic vegetation in Chilika .Submerged aquatic vegetation (SAV), represent an important component of many lagoon ecosystem. SAV supports the health of these. Thus the submerged aquatic vegetation act as a health indicator of the lagoon ecosystem, but some times some species become invasive and causes deterioration in the health of the lake. Therefore proper management of the submerged vegetation is required.

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