

Algal Diversity in Southern Sector of Chilika Lagoon

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ABSTRACT

Fifty five algal taxa comprising of 15 species of Cyanophyta, 2 Rhodophyta, 16 Chlorophyta, 4 Euglenophyta and 18 Bacillariophyceae under Heterokontophyta were recorded in Chilika lagoon in different seasons of 2013-14 in a survey. Of these *Cyanobacterium diachloros*, *Aphanocapsa Marina*, *Pseudonabaena limnetica*, *Spirulina major*, *Spirulina subtilissima*, *Oscillatoria limosa*, under Cyanophyta, *Euglena agilis*, *Euglena caudate* under Euglenophyta. *Scenedesmus bijugatus*, *Urenema elongatum* under Chlorophyta. *Navicula amphirhynchus*, *Navicula major*, *Gomphonema micropus*, *Cyclotella maxima*, *Pinnularia subsimilis*, *Pleurosigma normanii*, *Synedra tobulata*, *Cymbella affinis*, *Coscinodiscus subtilis* under Bacillariophyceae of Heterokontophyta recorded in the survey. (Maximum number of algal species was observed in winter followed by summer and post monsoon seasons.) Southern sector shows maximum algal diversities. The Cyanophytes followed by Bacillophyta then Chlorophytes were rich in Southern sectors. The agarophyte *Gracilaria verrucosa* recorded in the Rambha sector of the lagoon.

Keywords: Chilika Lagoon; Algal Diversity; Salinity Gradient; Seasonality

Introduction :

The Chilika lake is a brackish water lagoon, located between the Puri, Khurda & Ganjam districts of Odisha state, on the east coast of India

at the mouth of Daya river, flowing into the Bay of Bengal. It is the largest coastal lagoon, in India and second largest lagoon in the world.

The lake is situated in the globe between latitude 19^o43'N and longitude 85^o19'E, 35. The fresh water input into the lagoon is from Daya and Bhargabi rivers, several other rivulets and also salt water from Bay of Bengal. Due to confluence of fresh and salt water, a distinct salinity gradient is maintained in different seasons in the lagoon ranging from 1 -33 ppt basing on which it is divided into four sectors i.e. Southern, Central, Northern and Outer channel sector. Prior to 2001 in Southern sector the salinity was moderate (8 - 20 ppt). Due to tidal impact, coupled with closure of the mouth connecting to the sea the salinity level in the Outer channel sector was nearly similar to the seawater during most times of the year except the rainy season [Rath et al 2006]. An assemblage of marine, brackish and freshwater ecosystems in Chilika lagoon encourages occurrence of diverse group of phytoplankton, aquatic flora and fauna, hence is one of the biodiversity of hot spots in India. The qualitative and quantitative distribution of algal diversity with regional variation in the different stations of the Chilika Lake during the

study period. The phyco-diversity in the lagoon is a subject of interest since 1930s to estimate the trophic status of the lake and its direct relevance to fisheries. The algal flora of the lagoon was studied first by (Biswas, 1932) and subsequently (Roy, 1950-51), (Ahmed, 1966), (Patnaik, 1973, 1978), (Raman et al 1990), (Adhikary & Sahu, 1992), (Rath & Adhikary, 2005) have documented the algal flora including their seasonal variation at different salinity gradient of the lagoon. In the present work algal forms occurring in different seasons at the southern sectors of the lagoon was studied and the changes in their diversity were assessed.

Materials and Methods :

Algal taxa were sampled during summer (May 2013), post monsoon (September 2013) and winter (December 2013- January 2014) at three different locations in the Chilika lagoon. These were SI (Ghanta Silla, Southern sector), SII (Rambha Southern Sector) SIII (Palur canal). Samples were stored in Tarson made specimen tubes fixed on sport with 4% formalin and brought to the laboratory for analysis. For sampling of plankton a 45 µm pore size plankton net was used. Attached algae, e.g. epilithic, epiphytic and epipelagic forms were collected using forceps, scalpel and nylon brush. Each sample was given a voucher number and deposited at the Department. The organisms were identified following (Kutzing, 1865), (Huber-pestalozzi, 1942), (Desikachary, 1959, 1987 & 1989), (Ramanathan, 1964), (Philipose, 1967), (Ettl & Gartner, 1995), (Komarek & Anagnostidis, 1998 & 20015) and (Wolowski & Hindak, 2005).

Results and Discussion : Algal Diversity in Chilika Lagoon in 2013-14

A total of fifty five algal species were documented from three different southern sector collection sites of Chilika lagoon during different seasons of 2013. These belonged to Cyanophyta (15 species), Rhodophyta (2 species), Chlorophyta (16 species), Euglenophyta (4 species) and Heterokontophyta under class Bacillariophyceae (18 species). Seasonal variation in the distribution of these algal species in different collection sites is given in Table 1 and recorded consistently in specific sectors in all the seasons. During summer 45 algal species were recorded from different sectors of the lagoon. These were mostly of the class Bacillariophyceae under Heterokontophyta (17) followed by Chlorophyta (12), Cyanophyta (9), Euglenophyta (4) and Rhodophyta (3). A significant decrease in occurrence of algal taxa was observed during the post-monsoon period (September 2013) in comparison to preceding summer (May 2013) due to flooding of riverine silted freshwater into the lake resulting in alteration in the physico-chemical characteristics of water. Totally 8 species of Cyanophyta, 1 Rhodophyta, 6 Chlorophyta, 2 Euglenophyta and 7 Bacillariophycean members occurred during post monsoon season in the lake and *Pseudanabaena limnetica* under Cyanophyta and *Amphora elliptica* under Bacillariophyta were exclusively occurred during this season. Maximum number of algal taxa comprised of 15 Cyanophytes, 2 Rhodophytes, 16 Chlorophytes, 4 Euglenophytes and 18 Bacillariophycean members occurred in the winter season. Hence, diversity wise winter months favoured occurrence of maximum number of algae in the lagoon followed by summer and post monsoon period.

Table 1 . Seasonal occurrence of algal species in different locations of Chilika lagoon 2013, SI (Ghanta Silla, Southern sector), SII (Rambha Southern Sector) SIII (Palur canal), S-Summer, PM- Post monsoon, W-winter.

	SI			SII			SIII		
	S	PM	W	S	PM	W	S	PM	W
Cyanophyta									
Cyanobacterium diachloros Komarek & Anagnostidis			+						
Aphanocapsa Marina Hansgirg									+
Merismopedia glauca (Ehrenberg) Kutzing	+								
Merismopedia punctata Meyon	+		+						
Chroococcus limneticus Lemmermann	+								
Pseudonabaena limnetica Komarek		+			+				
Pseudonabaena minima Anagnostidis				+					
Spirulina labyrinthiformis Kutzing ex Gomont					+				
Spirulina major Kutzing ex Gomont				+					
Spirulina subtilissima Kutzing							+		+
Oscillatoria limosa Agardh exomont				+	+	+			
Oscillatoria princeps Vaucher ex Gomont						+			
Oscillatoria sancta Kutzing ex Gomont				+		+			
Lyngbya aestuarii Leibman ex Gomont						+			
Anabaena variabilis Kutzing ex Bornet et Flahault				+					
Rhodophyta									
Ceramium diaphanum Roth				+			+		
Gracilaria verucosa (Huds.) Papenfuss			+	+	+	+			+
Chlorophyta									
Spirogyra sp.				+	+	+			
Closterium venus Kutzing						+			
Chaetomorpha linum (Mueller) Kutzing				+	+	+			+
Cosmarium decoratum G.S.West						+			
Cosmarium lundellii Delponte var. ellipticum W.et G.S.West							+		
Cosmarium miscellum Skuja						+	+		
Cosmarium punctulatum Brebisson	+			+		+			+
Enteromorpha compress (L) Nees						+			
Enteromorpha intestinalis (L) Nees						+			+
Euastrum dubium Nageli	+		+						
Pediastrum tetras (Ehrenberg) Ralfs					+	+			
Chlorella Protothecoides Kutzing				+		+			
Scenedesmus calyptanus Comas	+								
Scenedesmus dimorphus (Turpin) Kutzing	+		+						
Scenedesmus protuberans Fritsch et Rich				+		+			
Uronema confervicolum Lagerheim						+	+		+
Euglenophyta									
Euglenophy Euglena acus Ehrenberg				+		+			
Euglena agilis Carter			+				+	+	
Euglena caudate Hubner		+			+	+			
Lepocinclis playfairiana Deflandre	+				+		+		
Bacillariophyta									
Melosira decussate (Ehrenberg) Kutzing							+	+	+
Odontella polymorpha Kutzing				+		+	+		+
Coscinodiscus marginatus Ehrenberg							+		+
Chaetoceros decipiens cleve							+		+
Cyclotella maxima Kutzing				+			+		+

Fragilaria crotonensis Kitton							+		+
Synedra tobulata Kutzing							+	+	+
Synedra ulna (Kutzing) Hustedt								+	+
Pinnularia subsimilis Gandhi									+
Pleurosigma normanii Ralfs								+	+
Navicula amphirhynchus Ehrenberg							+		+
Navicula major Kutzing								+	+
Gomphonema micropus Kutzing								+	+
Cymbella affinis Kutzing								+	+
Amphora elliptica Kutzing							+	+	
Nitzschia acuta Cleve								+	+
Hantzschia amphioxys (Ehrenberg) Grunow in Cleve & Grunow						+			+
Epithemia gibberula Grunow							+	+	

Diversity of Seaweeds in Chilika Lagoon at Different Salinity Gradient

Occurrence of seaweeds in estuaries and lagoon is generally dependent on the salinity of the water bodies. Four species of seaweed, comprising three under Chlorophyta. Chaetomorpha limum, Enteromorpha compressa, Enteromorpha intestinalis and one under Rhodophyta, Gracilaria verrucosa were found growing luxuriantly in different sectors of Chilika lagoon. Comparative study of their qualitative and quantitative occurrence with the reports .

Quantitative increase in the agarophyte Gracillaria verrucosa in the Southern as well as in the outer channel sector which was earlier confined only to a pocket in the Southern sector of the lagoon is an important finding of the present work. Consequent upon mixing of saltwater and freshwater due to high and low tide in the outer channel sector, and at the nearby locations in the Central sector, salinity of the lagoon increased in these area varying from 10-30 ppt with continuous diurnal change, hence is now suitable for maximum occurrence of the agrophyte which can be harvested for use in cottage industry.

Table -2 : List of Algae with species number

SL No.	Name of algae	Species Number
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1	Cyanophyta	15
2	Rhodophyta	02
3	Chlorophyta	16
4	Euglenophyta	04
5	Bacillariophyta	18

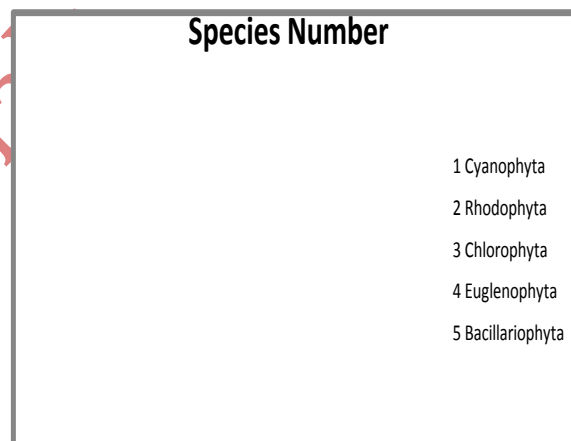


Fig-1 : List of Algae with species number

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