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RESEARCH ARTICLE

PHYTOPLANKTON DENSITY IN RELATION TO PHYSICO - CHEMICAL PARAMETERS OF KANGSABATI RESERVOIR, WEST BENGAL, INDIA

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ABSTRACT

Phytoplankton play an important role as primary producer in aquatic ecosystem and a number of factors have been attributed to influence the density of it. The present study was conducted to assess the relationship between the physico – chemical parameters and phytoplankton density of Kangsabati Reservoir. A monthly sampling was carried out from March, 2010 – February, 2011 at three different stations. The eight classes of phytoplankton comprises 64 species among which Chlorophyceae 21 species, Bacillariophyceae 14 species, Cyanophyceae 12 species, Charophyceae 8 species, Tribophyceae 2 species, Dinophyceae 4 genera, Ulvophyceae 1 species and Xanthophyceae 2 species,. The phytoplankton population density showed significant correlation with the parameters like temperature, D.O., phosphate, total inorganic nitrogen etc. This population was high in winter months and low in the month of rainy season.

INTRODUCTION

Phytoplankton not only serve as food for aquatic animals, but also plays an important role in maintaining the biological balance and quality of water. The occurrence of specific phytoplankton can be used as an indicator of water quality as well as trophic status. Phytoplankton densities are sensitive to physical and chemical changes in the water comprising the qualitative and quantitative fluctuation concerned with biological productivity. The PH, dissolved oxygen, alkalinity, phosphate, nitrate and other nutrients are responsible for phytoplankton production in the aquatic environment. Interrelationship of physico-chemical and biological conditions have been investigated in various aquatic habitat by a number of workers like Sukumaran and Das (2001), Srivastava, (2005), Ashutosh Mishra *et al*. (2010), Azari, Mohebbi and Asem (2011), Singh and Balasingh (2011)., Pradhan *et al*. (2008), Chowdhury *et al.* (2007)., Benarjee and Narasimha (2013), Kotadiya and Solanki (2013), Adesalu and Nwankwo (2008), Tiwari and Chauhan (2006), Tas and Gonulol (2007). The present study deals with the impact of various physico-chemical factors on the abundance of phytoplankton population in Kangsabati reservoir.

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MATERIALS AND METHODS

Kangsabati, a man made reservoir comprising 7400 ha. average water spread area, has been set up during the year 1965-1966 on the river of Kansai and Kumari at Mukutmanipur, West Bengal, India. The reservoir is located about 67 Km southwest from the Bankura Town, West Bengal. Geographically it is situated in between 22° 55'16.53" N - 23°2' 30.41"N latitude and 86° 37' 55.30" E - 86° 47' 23.35" E longitude. Reservoir is used for different purposes like irrigation, drinking water supply, pisciculture etc. Generally, Kangsabati reservoir is lentic water body but in monsoon it becomes lotic when water level exceeds maximum limit of water holding capacity. The map of Kangsabati reservoir has been depicted in Figure – 1.

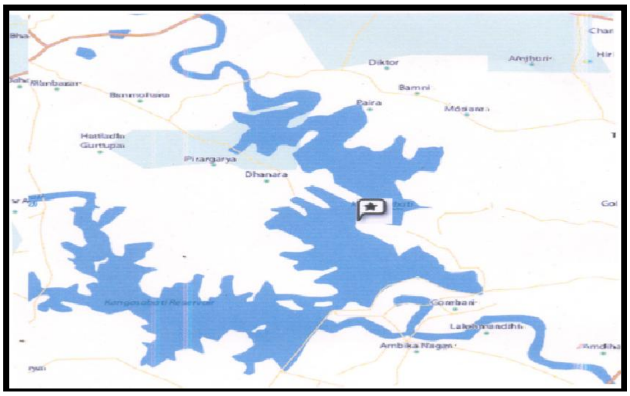

Fig. 1. Kangsabati Reservoir (Blue Shaded Area) Map.

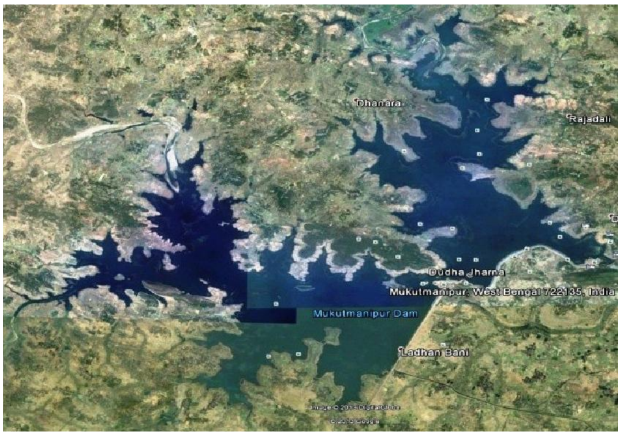

Fig. 2. Google earth image of Kangsabati Reservoir

Fig. 3. Open view of Kangsabati Reservoir

Water samples were collected from the three stations viz. Sadarghat, Aparajitaghat and Peerless ghat called by local people. Monthly samples of subsurface water were collected during last week of each month from March, 2010 to February, 2011 at 8 A.M - 9.30 A.M in clean plastic air tight bottles. The water and air temperature were recorded by minimum-maximum hydro-thermometer and thermometer respectively; pH by pH meter; dissolved oxygen by Winkler's method; photic depth by Secchi disc method; free Co_2, alkalinity, chlorinity, phosphorus, total inorganic nitrogen, Calcium, Magnesium and hardness by APHA (2008). Qualitative and quantitative phytoplankton analysis of the reservoir was done for the same period. From each spot 75L of water samples was filtered through plankton net of bolting silk No.25 (mesh size 64 micrometer). All the filtered content was then transferred to 100 ml container. 4% formalin and few drops of glycerin were added to it. Supernatant plankton free water was removed and sedimentary phytoplankton was counted by Sedgewick-Rafter cell method (Adoni, 1985). Identification of phytoplankton was done under microscope following standard books, keys and literatureof Smith (1950), Prescott (1975), Anand (1980), Desikachary (1959), Philipose (1967), www.algaebase.com and with the help of experts of Botany Department, Vidyasagar University, west Bengal, India. Pearson correlation matrix was used to establish the relationship among various environmental variables and phytoplankton density with the help of Statplus software for windows.

RESULTS AND DISCUSSION

Temperature: It is very important for its role in chemical and biological activities of organisms in the aquatic media. The mean values of atmospheric temperature were found to vary 25.0 ± 1.00 ^{0} C in December-2010 to 36.83 ± 0.67^0 C in April-2010 (Table – 1). The maximum air temperature was recorded in summer, while the minimum was recorded in the winter. Similar result was observed in Satak Reservoir, Madhyapradesh (Yadav *et al*., 2013). Water temperature followed closely with the air temperature and fluctuated between 31.66± 0.78 ^{0}C in July-2010 to 18.33 ± 1.52 ^{0}C in December -2010 (Table – 1). The water temperature was always less than air temperature and it was recorded to be lower than air temperature 2.26 ^{0}C to 11.41 ^{0}C. Present study revealed that all classes of phytoplankton except ulvophyceae (Table -5) had a negative relationship with water temperature. Similar trends had been found by Stefanie Schabhiittl *et al* (2013) and Devika *et al*(2006) also reported the same.

Water transparency: It was higher in between end of winter and beginning of dry season as a result of reduced rain. Similar type of observation was reported in Kangsabati reservoir (Kundu *et al*., 2005). The mean values of transparency were ranged between 40.83± 7.16 cm (May-2010) to 308.5 ± 13.93 cm (February -2011) during the present study (Table – 1). Factors affecting transparency of water are siltation, microscopic organisms and organic matter (Mishra and Saksena 1991). The water of the Kangsabati reservoir became turbid due to suspended solids being washed off with rain water and water wave produced by heavy airflow.

Conductivity: Electrical conductivity (ES) is a measure of water capability to transmit electrical current and also it is a tool to asses the purity of water (Murugesan *et al*., 2006). Electrical conductivity of water depends upon the concentration of ions and its nutrient status and variation in dissolve solid content. The mean value of conductivity was higher i.e. in summer months than lower in the month of rainy season. Similar pattern was recorded by Figueredo and Giani (2001). Phytoplanktons of class Dinophyceae and Tribophyceae increased population markedly in favour of conductivity.

p^H : It is the scale of intensity of acidity and alkalinity of water and measures the concentration of hydrogen ions .Sreenivasan (1964) observed that a large variation in p^H of water is an indicator of a highly productive nature of the water body. The variation of p^{H}ranged between 7.32 ± 0.12 in March-2010 to 8.45 ± 0.34 in December-2010 (Table – 1).Water quality is slightly alkaline throughout the year. In winter season p^H range increased but in other season minute differences were observed. Kundu *et al*. (2005), Mukherjee and Praharaj (2009) also exhibited similar results and considered as a safe range for aquatic life. The P^H showed positive correlation which indicated high P^H, high phytoplankton production – Dogiparti *et al.* (2013). Such investigation supported to our enquiry.

Dissolved oxygen: It is very important parameter in water quality assessment .Its presence is highly effective for maintenance of biological life of aquatic ecosystem. The mean values of D.O. content were to vary in between 7.2± 0.6 to 12.4±0.4 ppm during study period (Table – 1). D.O. showed inverse relationship with temperature which was also reported by several workers (Rani *et al*., 2004; Chattopadhyay, 2007). Higher D.O. during winter might also be due to photosynthetic activities of aquatic plants and specific types of algae at upper level of the water body.

Alkalinity: Alkalinity of water is a measure of its capacity to neutralize acids. Presence of hydroxides, carbonate and bicarbonate are usually considered for determination of alkalinity. The mean values of total alkalinity ranged between 40.67±1.14 mg/l in September-2010 to 94.0 ± 1.0 mg/l in May-2010 (Table – 1). Kedar, Patil and Yeole (2008) recorded maximum alkalinity in summer and minimum in monsoon probably due to rainfall in Rishi lake, Maharastra. Similar results also expressed by Islam (2002) in a pond of Rajshahi University, Bangladesh. The correlation of alkalinity wasnegative with the members of Chlorophyceae, Cyanophyceae, Charophyceae, Tribophyceae and Ulvophyceae.

Chloride: The mean values of chloride were found to vary between 110.91 ±8.40 mg/l in February-2011 to 305.30 ± 43.04 mg/l in June-2010 (Table – 1). During present investigation, it has been observed that the chloride content was higher in the month of summer. Similar type of observation had been found in Ranjitsagar reservoir by Kumar, Parashar, qureshi and Patiyal (2006). It has been reported by many worker about high chloride content during summer. It is due to evaporation as well as reduction of water volume which helps to increase concentration of salts.

Free CO_2: Carbon di oxide is produced as a result of respiration of aquatic organisms. Due to respiration of organisms, carbon di oxide increases in water which subsequently change the proportion of carbonate and bicarbonate ion (Boyd, 1981). In the present study, Co_2 values were observed in between 3.33 ± 0.56 in July-2010 to 9.66 ± 1.52 mg/l in January-2011(Table – 1). In 2005, Kundu *et al*. reported free Co_2 range 5 to 12 mg/l in the Kangsabati reservoir. Generally, during winter season free Co_2 remain high in the water due to low temperature. Chattopadhyay (2007) also reported a negative co-relation of temperature with Co_2 in Krishna Sayarlake at Burdwan. Free CO_2 supported the growth of phytoplankton population specifically the representative of Chlorophyceae and Bacillariophyceae (Table -5).

Salinity: It plays an important role in the growth of culture organisms through osmoregulation of body minerals from that of the surrounding water and acts as a dynamic indicator of the nature of the exchange system. It expressed maximum in summer season 0.57± 0.07 inJune-2010 & minimum in winter season 0.22 ± 0.01 in February-2011(Table – 1). Similar results had been registered by Martin *et al*(2008) from Coachin estuaries and Satpathy *et al.* (2009) in Kalpakkam coast of south east India.

Hardness: In most of the fresh water , total hardness is mainly occupied by calcium and magnesium ions. Hardness varied from 112.62±4.35 ppm in January-2011 to 195.36 ± 3.08 ppm in August-2010 (Table – 1). In few cases during rainy season (July to Sept) hardness of water abruptly increase due to addition of Ca & Mg ions through surface runoff from soil and sedimentary rocks. The contents released from dead molluscan shell may also increase the concentration of total hardness (Bhatt *et al*., 1999). These findings suggest that the water body is hard mainly in the transitional period of summer and rainy season. A group of algae under the class Cyanophyceae bridges the positive relationship with hardness. Jhingran (1985) also found direct relationship between hardness and plankton production, and stated that hard water enhance the productivity than soft water.

Phosphorus: The most critical single element in maintaining aquatic productivity is phosphorus, though it is one of the most limiting factors of production in Indian reservoirs (Das, 2000). The mean values of phosphorus ranged between 0.014 to 0.199 mg/l. Observed values was maximum in the month of August-2010 & minimum in March-2010 (Table – 1). According to Sreenivasan (1964) normal range of phosphate concentration in water is 0.1 to 0.2 mg/l. Finding result remained within the normal range during the present study. Many worker (Sunkad and Patil, 2004) suggested during monsoon phosphorus range become greater than other season either due to phosphate rich agricultural runoff reaching the reservoir or prevalence of low temperature in winter reduces its utilization by phytoplankton . Similar pattern was recorded by Rawat and Sharma (2005), Abdar (2013).

Total inorganic nitrogen: Nitrate is plant nutrient which impacts on algal population. The amount of total inorganic nitrogen(ammonia, nitrate and nitrite) was observed maximum in the month of rainy season i.e. 0.5 mg/l and minimum in the month of summer season 1.96 mg/l. (Table-1). Nitrogen content was higher in rainy season, which can be attributed to the fertilizer leached from surrounding agricultural field of the reservoir where as lower concentration in summer is due to utilization by plankton and aquatic plants. Similar results were was seen by Sivakumar and Karuppasamy (2008). Nitrate showed positive correlation with phytoplankton density particularly the plankton under Cyanophyceae. This statement was supported by Senapati, Ghosh and Mandal (2011).

Photic depth: Light penetration range within the water was maximum in February-2011 i.e. 287 ± 15.13 cm & minimum in May-2010 i.e. 32.66 ±5.50cm (Table – 1). It was observed that it became due to turbidity and rainfall during study period. Enough sunlight entry into the water body stimulate the photosynthetic activity consequently phytoplankton population increase in number and matched positive correlation with them marked specifically the classes viz. Chlorophyceae and Charophyceae (Table -5).

Table 1. Monthly values of physico-chemical parameters of kangsabati reservoir (March, 2010 - Feb., 2011)

PARAMETER(UNIT)	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT.	NOV.	DEC.	J AN.	FEB.
Air Temp.*C	33.58±0.92	36.83±0.67	34.33±1.17	34.33±1.03	35.83±2.36	34.50±0.50	35.67±0.75	31.06±0.90	31.25±0.90	25.0±1.00	32.16±1.04	35.25±1.51
Water Temp.*C	28.16±0.84	30.41±1.09	29.66±0.33	31.50±0.5	31.66±0.78	30.75±0.24	30.86±0.31	28.80±1.06	23.73±0.64	18.33±1.52	20.75±1.08	27.83±4.53
Transparency(cm)	181.66±6.34	93.50±25.5	40.83±7.16	105.83±21.09	133.0±23.01	188.34±27.12	174.16±5.10	193.66±12.47	189.66±14.02	188.16±15.05	239.5±55.60	308.5±13.93
Conductivity	15.73±0.09	17.11±0.37	16.77±0.18	17.04±0.104	16.43±0.17	15.88±0.1	12.26±0.24	12.14±0.24	12.32±0.09	11.95±0.09	28.39±0.47	13.98±0.3
PH	7.32±0.12	7.65±0.23	7.72±0.21	7.71±0.26	7.98±0.07	7.38±0.13	7.56±0.24	7.50±0.15	7.42±2.72	8.45±0.34	8.05±0.42	7.58±0.09
D.O(mg/l)	9.0±0.20	7.2±0.6	7.46±0.26	8.6±0.34	7.6±0.63	8.8±0.26	10.8±0.20	11.06±0.22	12.00±0.4	11.6±0.40	10.8±0.84	10.4±0.21
Alkalinity(mg/l))	54.33±1.52	71.00±1.0	94.0±1.0	79.0±1.0	79.66±2.07	60.34±1.52	40.67±1.14	68.67±0.56	80.34±1.52	60.33±0.57	62.33±3.21	68.66±1.15
Chloride(mg/l)	270.41±23.84	175.98±30.43	132.91±3.66	305.30±43.04	160.93±20.98	150.32±12.99	143.92±4.19	127.41±8.83	157.66±4.19	131.08±5.82	160.41±22.22	110.91±8.40
Phosphate (mg/l)	0.014	0.026	0.029	0.041	0.185	0.199	0.106	0.098	0.062	0.055	0.046	0.037
Total Inorganic Nitrogen (mg/l)	0.90	0.80	0.50	1.08	1.40	1.96	1.64	1.06	1.02	0.92	0.74	0.85
Hardness(ppm)	118.29±7.71	115.18±14.11	137.40±6.46	178.62±0.12	186.24±4.08	195.36±3.08	168.04±5.15	137.07±10.52	170.61±5.22	145.33±2.64	112.62±4.35	113.49±3.24
Salinity(ppt)	0.51±0.04	0.347±0.05	0.26±0.01	0.57±0.07	0.31±0.03	0.29±0.02	0.28±0.02	0.25±0.01	0.31±0.01	0.26±0.05	0.31±0.20	0.22±0.01
Photic Depth(cm)	170±8.0	81±18.68	32.66±5.50	95.33±18.58	117±25.51	174.35±29.93	157.0±3.00	176.66±10.40	175.50±17.51	163±6.55	216.66±48.75	287.00±15.13
Free $Co_{2(ppm)}$	3.66±0.34	3.66±0.34	3.66±0.34	4.00±1.0	3.33±0.56	3.66±0.56	5.34±0.57	7.00±1.00	5.00±1.00	3.66±1.90	9.66±1.52	6.00±1.732
Water level(ft)	399.0	396.0	397.40	397.40	405.0	427.4	432.8	417.0	415.8	415.6	409.40	409.2

Table 2. Monthly variation in phytoplankton groups (number of individuals/litre) in kangsabati reservoir from March, 2010 – feb, 2011

	Phytoplankton								
MonthS	Chlorophyceae	Bacillariophyceae	Cyanophyceae	Charophyceae	Tribophyceae	Xanthophyceae	Dinophyceae	Ulvophyceae	IND./L
March-2010	848	439	112	224	75	00	00	79	1777
April-2010	529	439	222	106	00	00	00	00	1058
May-2010	668	201	126	15	59	11	26	21	1440
June-2010	334	514	246	107	64	32	22	11	1106
July-2010	524	290	260	20	86	10	00	00	950
Aug-2010	306	50	179	73	00	00	00	00	698
Sept-2010	374	140	147	67	26	00	14	00	681
Oct-2010	587	53	693	80	00	00	00	00	1467
Nov-2010	298	107	160	128	16	00	06	00	720
Dec-2010	764	112	507	107	120	22	00	00	1813
Jan-2011	556	293	255	59	302	00	91	00	1424
Feb-2011	652	161	102	162	54	00	78	00	1312
Total	6440	264	3009	1148	802	75	237	111	14446
PERCENT VALUE(%)	44.58%	18.16%	20.83%	7.95%	5.55%	0.52%	1.64%	0.77%	

Table 3. P0pulation density (number of individual / litre) and percentage contribution of different group of phytoplankton in kangsabati reservoir during from march, 2010 – Feb, 2011

S.No.	CLASS	No. of Ind./L	Percentage (%)
1	CHLOROPHYCEAE	6440	44.58%
2	BACILLARIOPHYCEAE	2624	18.16%
3	CYANOPHYCEAE	3009	20.83%
4	CHAROPHYCEAE	1148	7.95%
5	TRIBOPHYCEAE	802	5.55%
6	XANTHOPHYCEAE	75	0.52%
7	DINOPHYCEAE	237	1.64%
8	ULVOPHYCEAE	111	0.77%

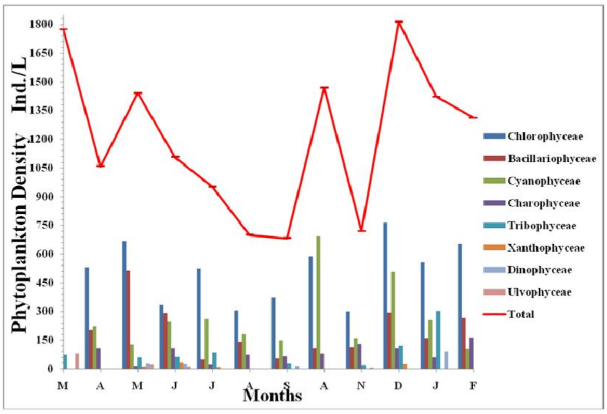

Figure 1. Month wise phytoplankton density (Ind. /L)

Water level

Maximum water level was 432.8 ft during September-2010 and minimum was 396.0 ft during April-2010 (Table – 1) due to heavy rainfall and minimum rainfall respectively.

PHYTOPLANKTON

The species composition, biomass, relative abundance, spatial and temporal distribution of phytoplankton are an expression of the environmental health or biological integrity of a particular water body (Khattak *et al*., 2005). In the present study, the total number of phytoplankton was low in rainy season (July – October) and high in summer (March – June) followed by winter (November – February). Hujare (2008) Ramulu and Benarjee (2013) were also reported phytoplankton density in different seasons in order of summer> winter> rainy. A total number of 64 phytoplankton genera belonged to eight groups namely Chlorophyceae - 21 genera, Bacillariophyceae - 14 genera, Cyanophyceae - 12 genera, Charophyceae - 8 genera, Tribophyceae - 2 genera, Dinophyceae -4 genera, Xanthophyceae - 2 genera, Ulvophyceae - 1 genera (Table - 4). The total phytoplankton population was occupied by Chlorophyceae – 44.58%, Bacillariophyceae – 18.16%, Cyanophyceae – 20.83%, Charophyceae – 7.95%, Tribophyceae – 5.55%, Xanthophyceae – 0.52%, Dinophyceae – 1.64%, Ulvophyceae – 0.77% annually (Table - 3).

Chlorophyceae

Among phytoplankton, Chlorophyceae was the dominant class. The occurrence of Chlorophyceae was highest i. e. 848 ind./L in March, 2010 and lowest i.e. 298 ind./L in November, 2010 (Tble - 2). The commonly occurring green algae were *Schizochlamys sp., Oedogonium sp., Mougeotia sp., Botryococcus sp., Pediastrum sp., oochlorellasp., Asterococcus sp.,* were dominant genera. *Schizochlamys* sp.,*Oedogonium sp., Mougeotia sp*. were found all over the year. Phytoplankton population was positively correlated with transparency, conductivity, P^H, free CO_2, photic depth. Rajagopal *et al.* (2010) also reported P^H play a significant role in distribution of chlorophycean members in fresh water zones.

BACILLARIOPHYCEAE

Nitzschia sp., Navicula sp., Synedra sp., Lyngbya sp., Diatom sp. were the dominant genera under the class Bacillariophyceae. The occurrence of Bacillariophyceae was highest i.e. 514 ind./L in the month of monsoon, 2010 (Table - 2).Similar trend had been found by George *et al* (2012) in Tapi estuarine area of Gulf of Khambhat, India. This class showed positive relationship with P^H, conductivity, alkalinity, salinity, chloride, free CO_2 (Table – 5). Similarly, Redekar and Wagh (2000) from their studies on the algae under Bacillariophyceae of Zuari coast of India concluded that salinity has a direct influence on distribution of Bacillariophyceans.

CYANOPHYCEAE

In the present study, we observed a few phytoplankton species such *as Ceratium hirundinella, Peridinium sp.* which are known as indicators of meso eutrophic waters (Wetzel and Likens, 1991). Cyanophyceae was one of the major groups of phytoplankton. The occurrence of this group could be attributed to the slightly alkaline condition and nutrient rich fresh water discharge, turbidity due to suspended sediment which favours growth (Harsha and Malammanavar 2004). Transparency, P^H, D.O., phosphate, total inorganic nitrogen, hardness and photic depth showed positive relationship with phytoplankton population (Table – 5). Similar trends were observed by George *et al.* (2012). The abundance of Cyanophyceae was found to be highest in the month of rainy season i.e. 693 ind./L and lowest in the month of late winter season 102 ind./L (Table - 2). Similar results was supported by Chowdhury *et al.* (2007). An *Anabaena sp., Microcystis sp., Oscillatoria sp., Nostoc sp., Lyngbya sp.* were the dominant genera.

CHAROPHYCEAE

The representative of Charophyceae were *Chara sp., Staurastrum sp., Micrasterias sp. and Netrium sp.*.These were maximum i.e. 224 ind./L in March, 2010 and minimum in number i.e. 15 ind./ L in May, 2010 (Table – 2). Phytoplankton density made positive relationship with transparency, dissolved oxygen,chloride, salinity, photic depth (Table – 5).

TRIBOPHYCEAE

Tribophyceae was most abundant in January, 2011 i.e.302 ind./ L and minimum 16 ind./L (Table - 2). *Tribonema sp., Perone sp., Ophiocytium sp.* were recorded. The density of this class corroborate positive relationship with transparency, conductivity, P^H, D.O., chloride, salinity, photic depth (Table – 5).

XANTHOPHYCEAE

This class comprises *Vaucheria sp., Botryococcus sp*. through out the study period. The density of the plankton was maximum i.e. 32 ind./L in June, 2010 (Table – 2) and found three to four months only during the study period. P^H, alkalinity, chloride, salinity, hardness, free CO_2 show positive relationship with the members of the said class (Table – 5).

DINOPHYCEAE

Ceratium sp., Peridinium sp., were the dominant genera of this class. Population was the highest i.e. 91ind./L and found in certain months (Table -2). The physico - chemical parameter comprises P^H, air temperature, transparency, conductivity, D.O., alkalinity, photic depth, free CO_2 made positive relationship with the population under the class Dinophyceae (Table – 5).

ULVOPHYCEAE

Enteromorpha intestinalis was the representative member of Ulvophyceae leading the highest position i.e. 79 ind./L in March, 2010 comparing with the lowest number 11 ind./L in summer month only. The increases of air temperature, water temperature, conductivity, salinity, chloride corresponded the positive relation with the member of ulvophyceae (Table – 5).

Conclusion

The maximum number of phytoplanktons during summer followed by winter indicates favourablephysico-chemical condition in relation to the phytoplankton population (Moharana and Patra, 2013; Laskar and Gupta, 2009., Chellappa *et al*., 2008). Transparency, D.O., p^H were observed high in winter months and these provide favorable environment for the growth of plankton. This has been confirmed by Agarwal *et al.* (2009). In Kangsabati reservoir, phytoplankton density was greatly concerned at consumer level of reservoir ecosystem. In this reservoir chiefly contributed classes were Chlorophyceae peak in March, Cyanophyceae peak in October, Bacillariophyceae peak in May, Charophyceae peak in March, Tribophyceae peak in January, Xanthophyceae peak in June, Dinophyceae peak in January and Ulvophyceae peak in March during the study period. Enormous growth and density of Cyanophyceae was due to the richness of nitrogen and phosphates. Sugunan (1995) also reported that blooming of *Microcystis sp.* was common in many of the Indian reservoirs. It corroborates with our results. According to the Kurasawa (1975) followed by the observation in Kangsabati reservoir now remain in oligotrophic condition. The density of phytoplankton were rich by Chlorophyceae>Cyanophyceae>Bacillariophyceae>Charophyceae>Tribophyceae>Dinophyceae>Ulvophyce>Xanthophyceae respectively in relation to water quality.

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