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LIMNOLOGICAL STUDY OF BAGHSAR LAKE DISTRICT BHIMBER AZAD KASHMIR

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Abstract

This paper is based on the limnological study of Baghsar Lake. The perennial Baghsar Lake located in Baghsar village, Subdivision Samahni, District Bhimber in Azad Kashmir is of mesotrophic to eutrophic nature. The water of the lake indicated average conductivity and total dissolved solids (TDS) at 499 µS/cm and 319.16 mg/L respectively with pH 7.1. A total of 122 algal species were recorded with 35 of Volvocophyta; 23 Chlorophyta; 38 Cyanophyta; 14 Euglenophyta; 11 Bacillarophyta and one *Glenodinium pluvisculus* belonging to Pyrrhophyta. Among aquatic plants *Lemna minor, Salvinia molesta* are freely floating and *Nelumbo nucifera* attached floating; *Typha domingensis* and *Phragmites vallatoria* emergent; *Ceratophyllum demersum*, *Hydrilla verticillata, Myriophyllum indicum*, *Potamogeton crispus*, *P. natans* and *P. pectinatus* submerged. The fishes *Barbus sarana, Catla catla, Cirrhinus mrigala (mori), Labeo calbasu, Labeo dero* and *Puntius ticto* have also been identified from the catch.

Introduction

Baghsar Lake is situated 975 m above the sea level in the Samahni valley of District Bhimber in Azad Kashmir (Mirza *et al*., 2006). District Bhimber in Azad Kashmir is a tourist spot and lies on the border of mesotrophic to eutrophic nature. It is bounded to Mirpur District in the northwest, shares borders with occupied Kashmir in the northeast and is bounded to Pakistan in the west and south. The area is very rich in archaeological remains. Bhimber falls on the route followed by the Mughal rulers of India for their frequent visits to the Kashmir valley.

Baghsar Lake lies at the longitude 74.8° and latitude 32.58° and is about 196 Km from Islamabad. The "Sar" local name for lake is nearly half Km long sheet of water that soothes the senses of the visitors. A Mughal fort is situated on the top of a hill in Baghsar. The fort overlooks the Sar Lake that adds grandeur to the area (Pithawala, 1953). Its average depth is 10 -12 feet (3-4 m) with varying width about 15 to 115 meters.

The lake is located just in the center of the Baghsar village surrounded by mountains. Main source of water for this lake is rainfall; however, water also springs out from its bed. In most parts of the year, water remains stagnant but during heavy rainfall in rainy season water over flows in the westward direction. The average yearly rainfall is 1500 mm (Mirza *et al*., 2006). The quality of lake water has altered by human activity, geological nature of the catchments area and yearly rate of the rainfall (Hem, 1985).

Khan & Zutshi (1978) reported primary productivity and trophic status of Naranbagh Lake and limnological studies on Dal Lake from Kashmir on Indian side (Zutshi & Vass, 1982). Leghari *et al.,* (2000) reported limnological studies of Tatta Pani Hot springs and River Punch at Tatta village District Punch, Azad Kashmir. However, the reports on the limnological studies of lakes in Azad Jammu & Kashmir are not available. The present work examines the water quality, flora and fauna of Baghsar Lake.

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Material and Methods

The samples for physicochemical analysis were collected in pre-washed 1.5 L plastic bottles. The bottles were rinsed three times with sample water. The samples were taken from the surface at a depth of 6-9 inches from five different points, integrated and a representative sample was drawn. The sampling was carried out in the months of June, October and February during 2004-2005.The temperature of the air 3 feet above the surface of water was measured with mercury thermometer. The pH was recorded with Orion 420A pH meter. Conductivity, salinity and total dissolved solids (TDS) were measured with Orion 115 conductivity meter. Hardness, chloride and alkalinity were determined by titration with E.D.T.A., silver nitrate and hydrochloric acid. Kjeldahl nitrogen was determined by using standard procedure (Anon., 1980). Spectrophotometry was used to determine orthophosphate, nitrite and nitrate. Orthophosphate was determined by reducing phosphomolybdic acid formed with ascorbic acid to molybdenum blue. Total phosphate was estimated by persulphate acid digestion method, followed by determination as orthophosphate. Nitrate was determined after derivatization with brucine sulphate. Nitrite was estimated using N-naphthyl ethylenediamine as derivatizing reagent. Sulphate was determined by turbidimetery as $BaSO_4$ using Hitachi 220 spectrophotometer. The dissolved oxygen (DO) in the samples was determined by Wrinkler method (Anon., 1980). Chemical oxygen demand (COD) was estimated by micro-dichromate oxidation method (Alen, 1989).

The metal ions Na, K, Ca, Mg, Fe, Pb, Cu, Zn, Ni, Cd, and Co were determined with Varian Spectr AA-20 atomic absorption spectrometer with standard burner head and air acetylene flame. The analysis was carried out in triplicate with integration time 3 second and delay time 3 second. Na, K, Ca, and Mg were determined after appropriate dilution. Sample (250ml) containing nitric acid (1 ml) was heated gently at 90-95^{o}C and was concentrated to about 15-20 ml. The solution was then transferred to volumetric flask and final volume was adjusted to 25 ml. The solution was analyzed by air acetylene flame atomic absorption spectrometer.

Biological samples: The biological samples were collected by grab sampling method; squezing aquatic plants by using plankton nets # 55 µm and dip nets. Samples of plants and fishes were preserved in 3-10% formalin. The samples were identified by comparison with the reference: Bacillarophyta (Husted, 1930; Patric & Reimer 1967), Cyanophyta (Desikachary, 1959), Chlorophyta (Prescott, 1962), Angiospermic plants (Cook, 1996) and fishes (Day, 1878 & Mirza, 1996). The new classification of algae was followed by Shameel (2001). All the drawings were made with the help of Camera lucida with the power 8x 40 under the swift microscope (Japan).

Results and Discussion

The results of physicochemical analysis of the parameters calculated for three seasons summer, autumn and winter are summarized in Table 1.

The pH of the Lake varied from 6.5 to 7.1. No significant change was observed in the water pH during different seasons and it was found within the permissible limits of 6.5-8.5 of WHO (Fresenius *et al*., 1988).

EC and TDS varied within the range 380-499 µS/cm and 243-319 µg/ml. No significant difference was observed in EC and TDS variation in various seasons for the Lake water. The values of EC and TDS were observed within the permissible limits of WHO but were slightly towards higher side in winter.

Table 1. Chemistry of Baghsar Lake District Bhimber Azad Kashmir.

S. No.	Parameters	Jun. 2004	Oct. 2004	Feb. 2005	Mean
1.	Time	1.00 PM	10.00 AM	2.00 PM	-
2.	Temperature of air (^oC)	30	25	20	25
3.	Temperature of water (^oC)	24	19.5	14.5	19.33
4.	Color	Bluish green	Bluish green	Bluish green	Bluish green
5.	pH (25 ^oC)	6.5	7.1	7.09	6.897
6.	Conductivity µS/cm	499.0	380.0	492.0	457
7.	TDS mg/L	319.4	243.2	314.9	292.48
8.	Salinity g/L	0.2	0.2	0.2	0.200
9.	Bicarbonates mg/L	207.0	170.0	204.0	193.66
10.	Hardness mg/L	200.0	149.0	190.0	179.66
11.	Chloride mg/L	44	43	85	57.333
12.	Sulphate mg/L	1.970	14	14.44	10.137
13.	Nitrite-N mg/L	0.010	0.004	0.008	0.007
14.	Nitrate-N mg/L	0.227	0.215	2.415	0.952
15.	Kjeldahl nitrogen mg/l	0.140	0.24	0.229	0.203
16.	Orthophosphate mg/L	0.007	0.082	0.097	0.062
17.	Total phosphate mg/L	0.237	0.092	0.100	0.143
18.	DO mg/L	4.50	3.66	5.12	4.427
19.	BOD mg/L	17.00	13	15	15.000
20.	COD mg/L	52.00	49	66	55.667
21.	Na mg/L	23.000	61.410	27.230	37.213
22.	K mg/L	9.690	38.000	5.910	17.867
23.	Ca mg/L	54.810	113.920	79.450	82.727
24.	Mg mg/L	19.730	49.840	20.720	30.097
25.	Fe mg/L	0.008	0.019	0.028	0.018
26.	Cu mg/L	0.001	0.005	0.168	0.058
27.	Zn mg/L	0.006	0.011	0.020	0.012
28.	Ni mg/L	0.016	0.011	0.025	0.017
29.	Pb mg/L	0.002	0.147	0.112	0.087
30.	Cd mg/L	0.005	0.006	0.148	0.053
31.	Co mg/L	0.037	0.45	0.096	0.194
32.	SAR	0.851	1.190	0.992	1.011

The presence of dissolved oxygen is required to prevent odor and is suitable for use by aquatic plants and other life forms. The dissolved oxygen was found within 3.66-5.12 µg/ml. Low oxygen contents were observed in summer because dissolved oxygen decreases with increase in temperature and *vice versa*.

Nitrates, nitrites and kjeldahl nitrogen: Nitrogen of mineral origin is rare in natural waters and presence of nitrogen compounds like Kjeldahl nitrogen, nitrite and nitrate in water indicate pollution with domestic wastewater. Nitrate nitrogen is highest oxidized form of nitrogen in water and WHO standards prescribe 10 mg/L as maximum permissible nitrate nitrogen concentration of potable water Frsenius *et al*., 1988. The Lake water investigated indicated nitrate nitrogen concentration (0.952 mg/L) within the permissible limits of WHO (Table 1).

Nitrite is more toxic and Kjeldahl nitrogen indicates the recent pollution from wastewater. Maximum permissible limit of WHO for both is 1.0 mg /L (Anon., 1984). The nitrite nitrogen (0.007 mg/L) and Kjeldahl nitrogen (0.203 mg/L) were also observed within the permissible limits of WHO (Table 1).

The chloride contents of lake water indicated variation within 43-85 mg/L. There was a little variation in chloride concentrations with seasons and indicated high values in autumn, may be because of little dilution in dry season. The concentrations varied within 1.97-14.44 mg/L. Seasonal variation indicated similar results as for chloride with higher values in autumn.

The phosphorous contents (orthophosphate and acid hydrolysable phosphate) in water may be due to the geological reasons and human activity, particularly from the detergents. However, the results of analysis for the orthophosphate and acid hydrolysable phosphate obtained from the Lake were found within the range of 0.007-0.097 mg/L, and 0.092–0.227 mg/L respectively. The difference between the two may be due to difference in the rates of dissolution of the phosphate in water.

BOD and COD are important parameters and indicate contamination with wastewater. The values of BOD and COD were found in the range 13.0-17.0 mg/L, and 49.0-66.0 mg/L respectively. Slightly higher values of COD warn about the pollution content caused by anthropogenic activities.

The metal contents in water may be divided into major metal contents (Na, K, Ca, Mg) and minor metal contents (Cu, Ni, Zn, Fe, Pb, Cd, Co). The major and minor metal contents indicated values Sodium 20.44-61.41 mg/L, Potassium 5.91-44.0 mg/L, Calcium 54.81-113.92 mg/L, Magnesium 19.73-45.22 mg/L, Iron 0.008-0.028 mg/L, Lead 0.002-0.147 mg/L, Cadmium 0.005-0.148 mg/L, Copper 0.005-0.168 mg/L, Zinc 0.006-0.020 mg/L, Nickel 0.011 0.025 mg/L and Cobalt 0.037-0.096 mg/L. The range of SAR was observed within 0.436-0.852. Keeping in view the mean values, the investigation of metal content indicated the following decreasing sequence:

$$Ca > Na > Mg > K > Co > Pb > Cu > Cd > Fe > Ni > Zn$$

Hardness showed values up to 230 mg/L that suggests the presence of $CaCO_3$ in the rock bed (Anon., 1984). The higher values of Potassium, Lead and Cadmium than permissible limits of WHO indicate the geological nature of the rechargeable zone of the lake.

Seasonal changes in the chemistry of the lake: The significant changes were not observed in the measurements of pH, electrical conductivity, orthophosphate, acid hydrolysable phosphate, nitrite, nitrate and organic nitrogen during the different seasons and were found well within the desirable standards of WHO for drinking water (Fig. 1, 3). The dissolved oxygen (DO) measurements for the lake, obtained during the monitoring period, indicated a variation range of 3.66-5.12 mg/L (Fig. 2). The increasing trend of DO concentration during winter is due to decrease in water temperature (Fig. 2).

The chloride concentration of the lake water indicated the variation of 43 mg/L to 85 mg/L (Fig. 2). The concentrations of major metal contents were found higher in autumn might possibly be due to less dilution in this season (Fig. 4). The minor metal contents showed seasonal variation without any specific pattern may be because of anthropogenic factors in different seasons (Fig. 5).

Biological studies: In the present studies, 122 algal species have been recorded with 35 species of Volvocophyta, 23 species of Chlorophyta, 38 species of Cyanophyta, 14 species of Euglenophyta, 11 species of Bacillarophyta and one species of *Glenodinium pulvisculus* belonging to Pyrrhophyta (Table 7).

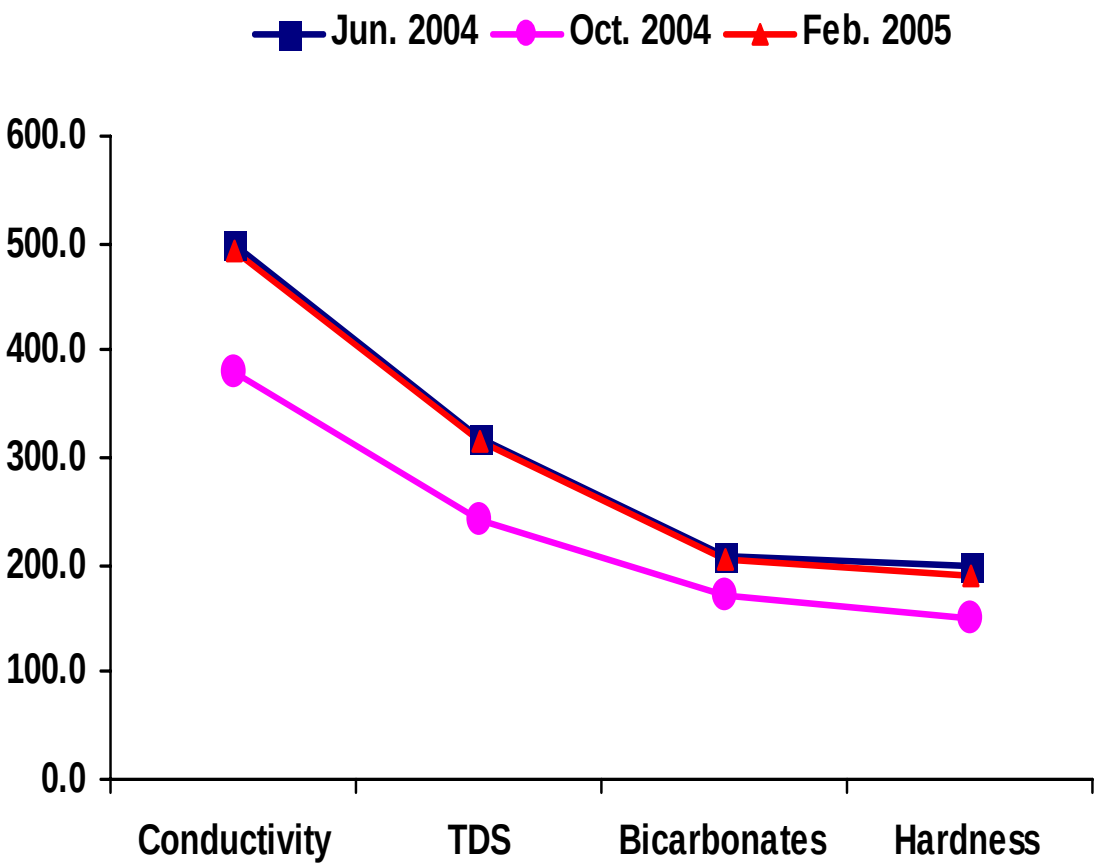

Fig. 1. Seasonal variation in Electrical Conductivity (µS/cm), Total dissolved solids, Carbonates and Hardness (mg/L) contents in Lake Water.

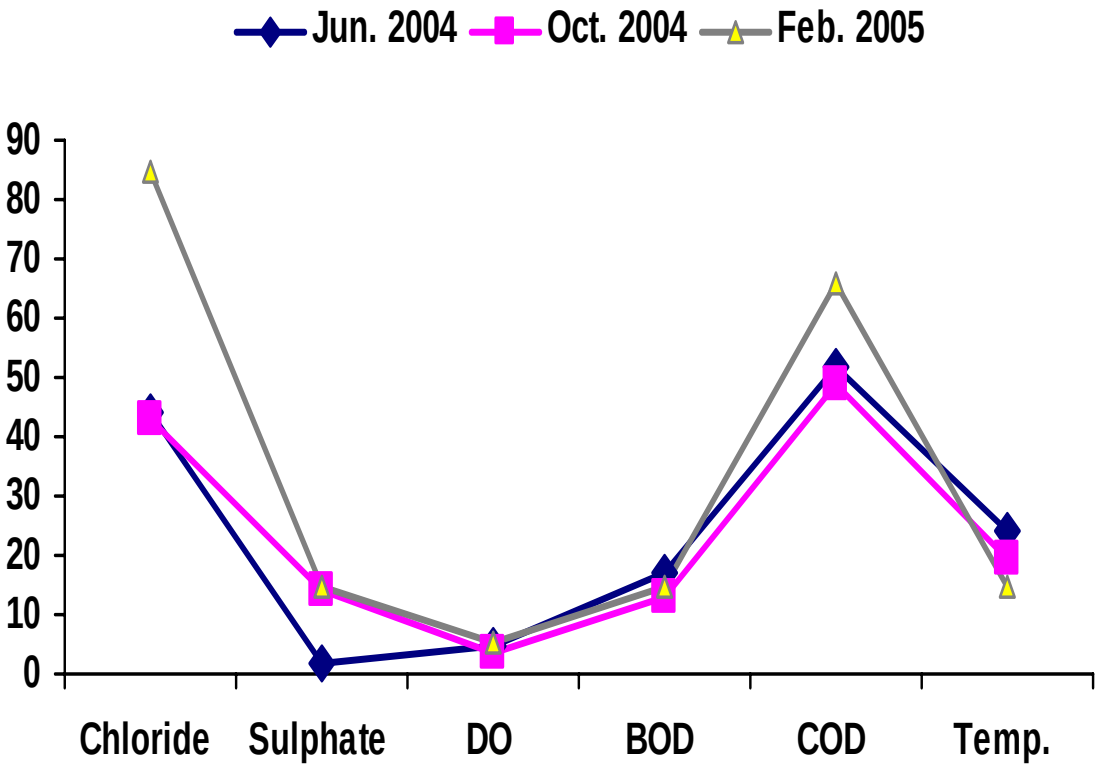

Fig. 2. Seasonal variation in Chloride and Sulphate, DO, BOD, COD (mg/L) and Temperature (Celsius) contents in Lake Water.

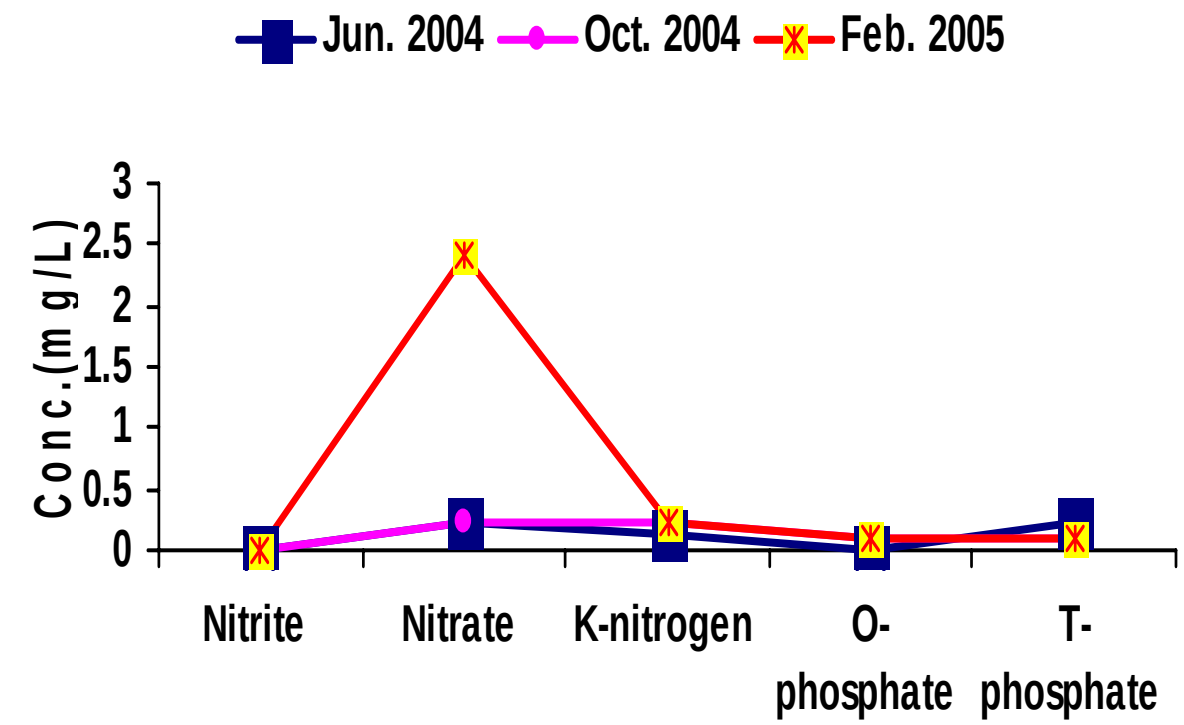

Fig. 3. Seasonal variation in nitrite, nitrate, organic nitrogen, orthophosphate and total phosphate contents Lake Water.

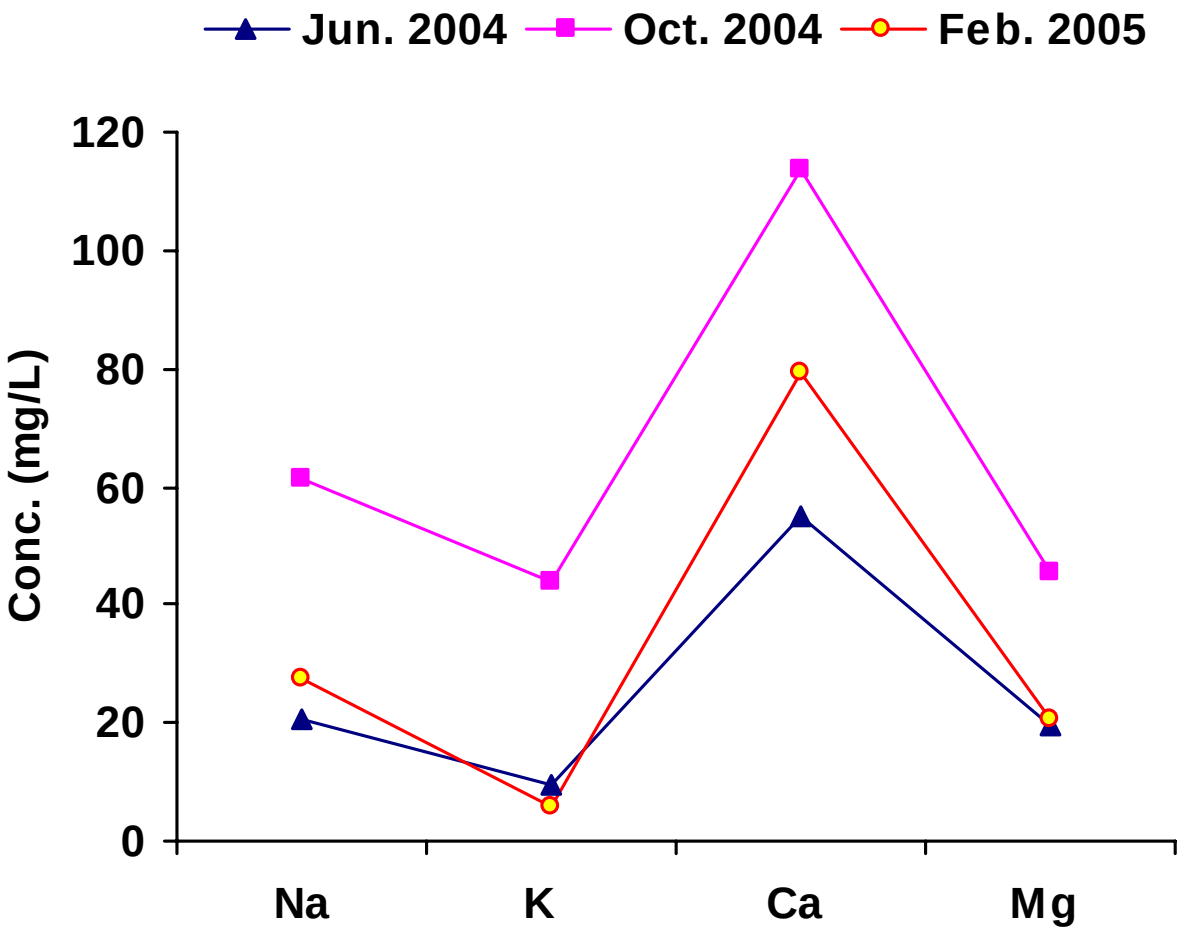

Fig. 4. Seasonal variation in Na, K, Ca and Mg contents in Lake Water.

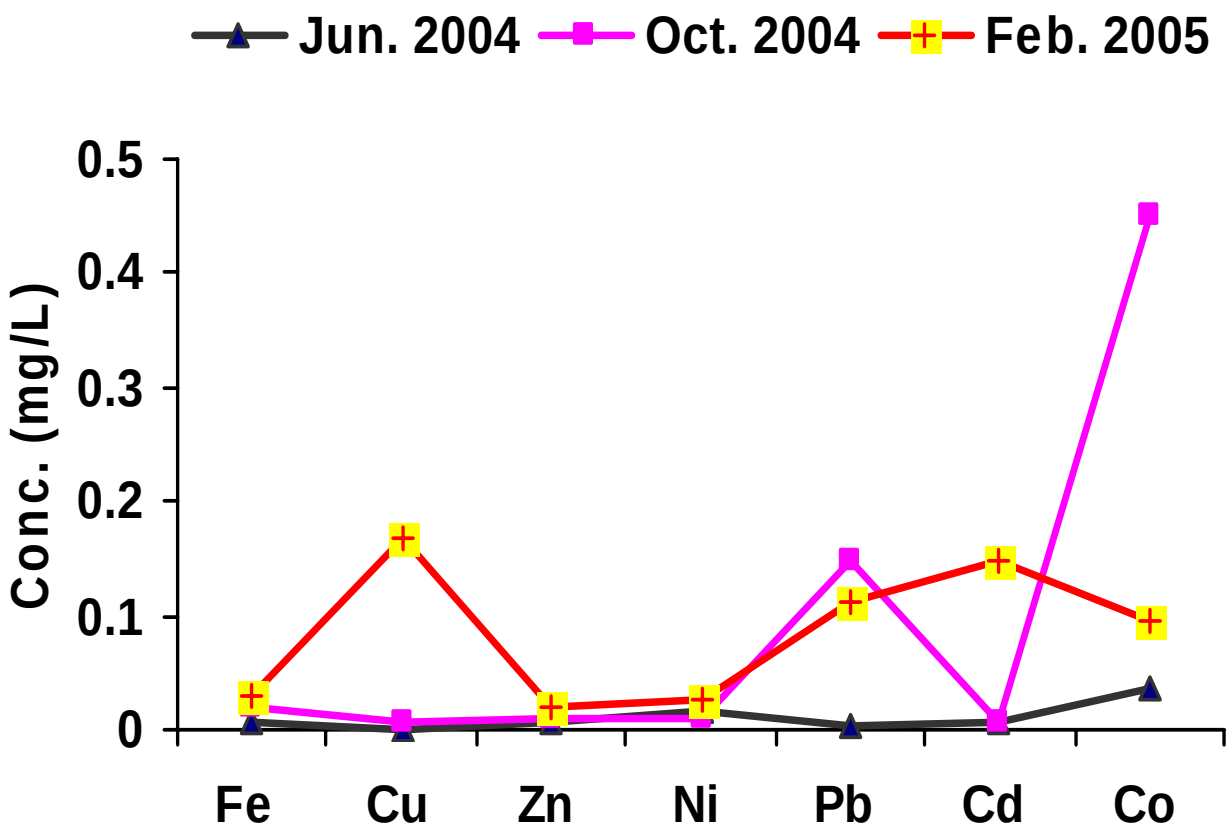

Fig. 5. Seasonal variation in Fe, Cu, Zn, Ni, Pb, Cd, and Co contents in Lake Water.

The Volvocophyta is mainly represented by the unicellular and colonial forms and were less frequent (Table 3). The planktonic dominant genera were *Ankistrodesmus* (1), *Chlorella* (1), *Chlorococcum* (1), *Closteriopsis* (1), *Crucigenia* (1), *Cosmarium* (9), *Coelastrum* (1), *Closterium* (6), *Cylindrocystis* (1), *Dictyosphaerium* (1), *Kirchneriella* (1), *Oocystis* (1), *Pediastrium* (4), *Planktosphaeria* (1), *Scenedesmus* (4), and *Pleurotaenium trabecula*. *Mougeotia* (2), *Spirogyra* (6) were filamentous species found free floating on the surface of water and *Stigeoclonium* (2), *Cladophora* (1), *Coleochaete* (2), *Ulothrix* (1), *Rhizoclonium* (2), *Pithophora* (1), *Oedogonium* (5) species were found attached as a periphytonic species belonging to Chlorophyta (Table 4).

Among 38 species of Cyanophyta, *Microcystis aeruginosa*, *M.flos-aquae*, *Arthrospira platensis*, *Chroococcus minor*, *C.minimus*, *C. minutus*, *Gomphos phaeria aponina*, *Merismopedia minima*, *M.tenuissima, Spirulina major* and *Sp.laxissima* were dominant. *Calothrix epiphytica* and *Chamaesiphon sideriphilus* were periphytonic species (Table 2).

Euglenophyta were found present with *Euglena deses*, *E. minuta*, *E.acus*, *Phacus acuminatus*, *Phacus curvicauda* and *Phacus orbicularis* as the dominant flora (Table 5).

In Bacillarophyta, 11 species were identified with *Cymbella venitricosa*, *Gomphonema ghosea* and *Pinnularia gibba* are dominant species (Table 6).

In Rhizopoda and Zooplankton, *Arcella discoids*, *A. vulgaris*, *Lecane sp*. and *Platyias patulus* were found present throughout the year (Tables 9-10).

The fishes: *Barbus sarana, Catla catla, Cirrhinus mrigala, Labeo calbasu, Labeo dero* and *Puntis tictio* were also present throughout the year (Table 11).

Table 2. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir.

S. No.	Phytoplankton Cyanophyta (Blue green algae)	Plankton	Epiphytic/ Periphytic	Epilithic
1.	*Aphanocapsa biformis*	++	-	-
2.	*Aphanocapsa elachista* var. *Planctonica*	++	-	-
3.	*Arthrospira massartii*	++	-	-
4.	*Arthrospira platensis* var. *tenuis*	+	-	-
5.	*Aphanothece saxicola*	++	-	-
6.	*Chroococcus tenax*	++	-	-
7.	*Chroococcus minor*	++	-	-
8.	*Chroococcus minimus*	++	-	-
9.	*Chroococcus turgidus* var. *maximus*	++	-	-
10.	*Chroococcus macrococcus*	++	-	-
11.	*Chroococcus minutus*	++	-	-
12.	*Chroococcus turgidus*	++	-	-
13.	*Cylindrospermum stagnale*	++	-	-
14.	*Calothrix marchica*	+	-	-
15.	*Gloeocapsa punctata*	++	-	-
16.	*Gomphosphaeria aponina*	++	-	-
17.	*Lynghya kuetzingii*	+	++	-
18.	*L.limnetica*	++	-	-
19.	*L.hierony musii*	++	-	-
20.	*L. martensiana*	++	-	-
21.	*Merismopedia minima*	+	-	-
22.	*Merismopedia tenuissima*	++	-	-
23.	*Merismopedia convolute*	++	-	-
24.	*Microcystis aeruginosa*	+++	-	-
25.	*Microcystis flos-aquae*	++	-	-
26.	*Oscillatoria curviceps*	+	-	-
27.	*Oscillatoria subbrevis*	++	-	-
28.	*Oscillatoria limosa*	++	-	-
29.	*Oscillatoria viza. gapatensis*	++	-	-
30.	*Oscillatoria chalybea*	++	-	-
31.	*Oscillatoria* sp. I	++	-	-
32.	*Oscillatoria* sp. II	++	-	-
33.	*Phormidium* sp. I	+	-	-
34.	*Phormidium corium*	-	-	++
35.	*Spirulina laxissima*	+	-	-
36.	*Spirulina major*	++	-	-
37.	*Calothrix epiphytica*	-	+	-
38.	*Chamaesiphan sider philus*	-	++	-

Symbols: - Absent, + Present, ++ Commonly present, +++ Dominant species

Table 3. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Volvocophyta.

S. No.	Planktonic form	Free	Epiphytic	Epilithic
1.	*Ankistrodesmus falcatus*	+	-	-
2.	*Chlorococcum humicola*	+	-	-
3.	*Chlorella vulgaris*	++	-	-
4.	*Closteriopsis longissima*	+	-	-
5.	*Crucigenia tetrapedia*	++	-	-
6.	*Cosmarium angulosum*	++	-	-
7.	*C. crispatum*	+	-	-
8.	*C. granatum*	++	-	-
9.	*C. granatum* var. *ocellatum*	++	-	-
10.	*C. leave*	++	-	-
11.	*C. leave* var. *rotundatum*	+	-	-
12.	*C. pyramidatum*	+	-	-
13.	*C. trituberculatum*	+	-	-
14.	*Cosmarium* sp. I	+	-	-
15.	*Coelastrum microporum*	++	-	-
16.	*Closterium calosporum*	+	-	-
17.	*Cl. dianae*	+	-	-
18.	*Cl. moniliferum*	++	-	-
19.	*Cl. lanceolatum*	+	-	-
20.	*Cl. ralfsii*	+	-	-
21.	*Cl. venus* var. *vanus*	+	-	-
22.	*Cylindrocysts* sp.	+	-	-
23.	*Dictyosphaerium pulchellum*	+	+	-
24.	*Kirchneriella lunaris*	+	-	-
25.	*Oocystis crassa*	++	-	-
26.	*Pediastrum duplex* var. *clathratum*	++	-	-
27.	*Pediastrum muticum*	++	-	-
28.	*Pediastrum tetras*	++	-	-
29.	*Pediastrum duplex*	++	-	-
30.	*Planktosphaeria gelatinosa*	++	-	-
31.	*Scenedesmus arcatus*	+	-	-
32.	*Scenedesmus bijuga*	+	-	-
33.	*Scenedesmus dimorphas*	++	-	-
34.	*Scenedesmus quadricauda*	++	-	-
35.	*Pleurotaenium trabecula*	+	-	-

Aquatic plants: The primary producers in the Lakes were phytoplankton and macrophytic vegetation. Submerged vegetation in Baghsar Lake were *Ceratophyllum demersum*, *Hydrilla verticillata*, *Myriophyllum indicum*, *Potamogeton pectinatus*, *P. crispus*, *P. natans* found growing on the bottom of the Lake with *Dichotomosiphon tuberosus*. The floating *Nelumbo nucifera were* attached to bottom with broader leaves covering the surface of the Lake. *Salvinia molesta*, *Lemna* minor and *Lemna sp.*, were found as free-floating plants. The *Typha domingensis* and *Phragmites vallatoria* were the emergent plants present on the sides and shallow area of the lake (Table 8). The excess growth of the primary producers, suggests that Grass carp (*C. idella*) and Gulfam (*Cyprinus carpio)* could be introduced to control the aquatic vegetation including the submerged and floating (Vass, 1980).

Table 4. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Chlorophyta.

S. No.	Filamentous/Periphyton	Free	Epiphytic	Epilithic
1.	*Dichotomosiphon tuberosus*	-	-	++
2.	*Stigeoclonium subsecundum*	-	++	++
3.	*Stigeoclonium stagenatile*	-	++	+
4.	*Cladophora glomerata*	-	++	+
5.	*Cloeochaete orbicularis*	-	+++	+
6.	*Cloeochaete solouta*	-	++	+
7.	*Ulothrix tenuissima*	-	++	-
8.	*Rhizoclonium fontanum*	-	++	-
9.	*Rhizoclonium crassipellitum*	-	++	-
10.	*Pithophora mooreana*	-	++	+
11.	*Oedogonium nannum*	-	++	-
12.	*Oedogonium pyriforme*	-	++	-
13.	*Oedogonium wolleanum*	-	++	-
14.	*Oedogonium reinschii*	-	++	-
15.	*Oedogonium hiaus*	-	+	-
16.	*Mougeotia Sp.I*	+	-	-
17.	*Mougeotia viridis*	+	-	-
18.	*Spirogyra micropunctata*	++	-	-
19.	*Spirogyra nitida*	++	-	-
20.	*Spirogyra subsala*	++	-	-
21.	*Spirogyra fuellebornei*	++	-	-
22.	*Spirogyra rhizobrachialis*	-	+	++
23.	*Spirogyra varian*	+	-	-

Table 5. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Euglenophyta.

S. No.	Euglenophyta	Free	Epiphytic	Epilithic
1.	*Euglena piscifermis*	+	-	-
2.	*Euglena minuta*	+	-	-
3.	*Euglena deses*	+	-	-
4.	*Euglena acus*	+	-	-
5.	*Euglena acus* var. *rigida*	+	-	-
6.	*Euglena oxyuris* var. *minor*	+	-	-
7.	*Euglena spirogyra*	+	-	-
8.	*Euglena proxima*	+	-	-
9.	*Euglena elastica*	+	-	-
10.	*Phacus acuminatus*	+	-	-
11.	*Phacus undulatus*	+	-	-
12.	*Phacus curvicauda*	+	-	-
13.	*Phacus orbicularis*	+	-	-
14.	*Phacus birgei*	+	-	-

Table 6. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Bacillarophyta.

S. No.	Bacillarophyta	Plankton	Epiphytic	Epilithic
1.	*Achnanthes affins*	++	-	-
2.	*Cymbella ventricosa*	++	-	-
3.	*Cymbella cymbbiferimis*	++	-	-
4.	*Cymbella ehrenbergii*	++	-	-
5.	*Cymbella affinis*	-	+	+
6.	*Diatoma vulgare*	-	+	-
7.	*Gomphonema ghosea*	-	+	+
8.	*Gomphonema paruulum*	-	++	+
9.	*Synedra affinis*	+	-	-
10.	*Pinnularia gibba*	+	-	-
11.	*Rhopalodia gibba*	+	-	-

Table 7. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Pyrrhophyta.

S. No.	Pyrrhophyta	Free floating	Attached floating	Emergent	Submerged
1.	*Glenodinium pluvisculus*	+	-	-	-

Table 8. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir. Aquatic Plants (Spermatophytes).

S. No.	Aquatic plants	Free floating	Attached floating	Emergent	Submerged
1.	*Phragmites vallatoria*	-	-	+++	-
2.	*Typha domingemsis*	-	-	+++	-
3.	*Ceratophyllum demersum*	-	-	-	+++
4.	*Myriophyllum indicum*	-	-	-	+
5.	*Potamogeton pectinatus*	-	-	-	+
6.	*P. natans and P.crispus*	-	-	-	+++
7.	*Nelumbo nucifera*	-	+	-	-
8.	*Salvina molesta*	+	-	-	-
9.	*Lemna minor*	+	-	-	-
10.	*Hydrella verticillata*	-	-	-	+

Table 9. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Rhizopoda.

S. No.	Rhizopoda	Free floating	Attached floating	Emergent	Submerged
1.	*Arcella discoids*	++	-	-	-
2.	*Acella vulgaris*	++	-	-	-
3.	*Arcella* species	++	-	-	-

Table 10. Algal Flora of Baghsar Lake District Bhimber Azad Kashmir Zooplankton.

S. No.	Zooplankton +	Free floating	Attached floating	Emergent	Submerged
1.	*Keratella* sp.	++	-	-	-
2.	*Lecane* Sp. I, II, III	+	-	-	-
3.	*Platyias patulus*	+	-	-	-

Table 11. Algal Flora &Fauna of Baghsar Lake District Bhimber Azad Kashmir Fishes.

S. No.	Fishes	
1.	*Barbus sarana*	+
2.	*Catla catla*	++
3.	*Cirrhinus mrigala*	++
4.	*Labeo calbasu*	++
5.	*Labeo dero*	+
6.	*Puntius ticto*	+++

Conclusion

Comparison of physicochemical parameters of Baghsar Lake with those of WHO recommended values shows that water is suitable for irrigation purposes and aquatic life. The study of fauna and flora shows that the Lake contains adequate food potential and micronutrients for fisheries development. Therefore, it is suggested that fishes could be introduced to control the aquatic weed and enhance the fish potential.

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