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The Seasonal Variation in Ionic Composition of Pond Water of Lumding, Assam, India

TAPASHI GUPTA and MRINAL PAUL

Department of Zoology, Lumding College, Lumding, Assam - 782 447, India.
Department of Chemistry, Lumding College, Lumding, Assam - 782 447, India.

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ABSTRACT

Ionic composition of water is an important parameter to determine the quality of water. The seasonal variations in TDS and conductivity are mainly due to the ionic composition of water. In the present study, the seasonal variations in TDS and conductivity of freshwater pond of Lumding were studied during the year 2010-2011. A positive correlation between TDS and conductivity was observed.

Key words: Conductivity, TDS, Lumding pond.

INTRODUCTION

The term ionic composition means conductivity of water.Conductivity is a measure of the ability of water to pass an electrical current. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, nitrate, sulfate, and phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron, and aluminum cations (ions that carry a positive charge). Organic compounds like oil, phenol, alcohol, and sugar do not conduct electrical current very well and therefore have a low conductivity when in water. Conductivity is also affected by temperature: the warmer the water, the higher the conductivity. For this reason, conductivity is reported as conductivity at 25 degrees Celsius (25 C).

Conductivity measurement is useful in estimation of the inorganic constituents in water. Dutta et al.(1988)have viewed that the levels of specific conductance depends on the inputs of large amount sa;lts and salts carried by cannals from the adjacent agricultural sites. It indicates the presence of dissolved nutrients in water. Electrical conductivity can be used as an index of TDS (Sreenivasan, 1964). After the removal of suspended solids, the material left in water is considered to be dissolved solid, which is in the formof solid residue after evaporation of water. TDS may consists of different kinds of nutrients and minerals. The present study deals with the study of seasonal variations in the conductivityand TDS of freshwater pond at Lumding.

Conductivity measures the capacity of a substance or solution to conduct electrical current. The electrical conductivity was found to fluctuate between108.00 µS/cm (November, 2011) and 246.30 µS/cm (May, 2011) in this pond and that falls within the range observed for Indian waters. Olsen (1950) classified the name for water bodies having conductivity values greater than 500.00 µS/cm as eutrophic.

MATERIAL AND METHODS

The study was conducted during May 2011to November 2011.

Water samples were collected from five locations randomly. The conductivity was measured by using standard conductometer and TDS was

determined by procedure given by APHA, (1995) and Trivedy & Goel(1984).

RESULS AND DISCUSSION

The monthly values of conductivity and TDS are given in table1 Specific Conductance is a measure of how well water can pass an electrical current. It is an indirect measure of the presence of inorganic dissolved solids, such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium, and iron. These substances conduct electricity because they are negatively or positively charged when dissolved in water. The concentration of dissolved solids, or the conductivity, is affected by the bedrock and soil in the watershed. It is also affected by human influences. For example, agricultural runoff can raise conductivity because of the presence of phosphate and nitrate.

Conductivity in streams and rivers is affected primarily by the geology of the area through which the water flows. Streams that run through areas with granite bedrock tend to have lower conductivity because granite is composed of more inert materials that do not ionize (dissolve into ionic

Table 1: Monthly values of TDS of five ponds of Lumding (mg/l)

Months	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5
April -11	120	90	125	126	126
May-11	180	150	180	185	180
June-11	200	200	200	250	300
July-11	287	600	260	553	460
Aug-11	250	550	250	500	466
Sept-11	200	500	150	200	250
Oct-11	195	245	100	100	180
Nov-11	35	40	90	100	120
Dec-11	30	35	80	90	110
Jan-11	40	40	90	90	100
Feb-11	50	45	100	100	100
Mar-11	85	80	120	120	126
Stdev-	±86.7	±205.0	±60.47	±153.68	±127.8

Table 2: Monthly values of Conductivity of five ponds of Lumding (µmhos/cm)

Months	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5
April-11	110	120	50	125	200
May-11	110	125	60	130	220
June-11	120	130	80	135	240
July-11	123	140	93	140	247
Aug-11	100	143	80	143	230
Sept-11	105	110	70	120	220
Oct-11	110	105	60	110	200
Nov-11	90	100	25	105	150
Dec-11	100	100	26	100	170
Jan-11	105	110	30	100	180
Feb-11	105	110	35	110	190
Mar-11	110	120	40	120	190
Stdev-	±8.84	±14.5	±23.3	±15.8	±29.2

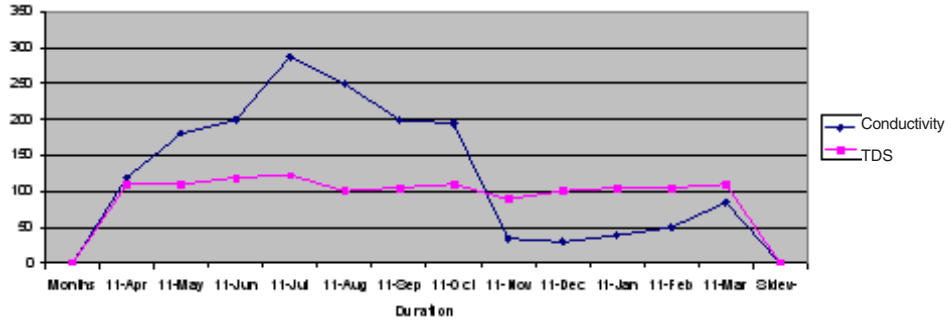

Fig. 1. Conductivity vs TDS of pond 1

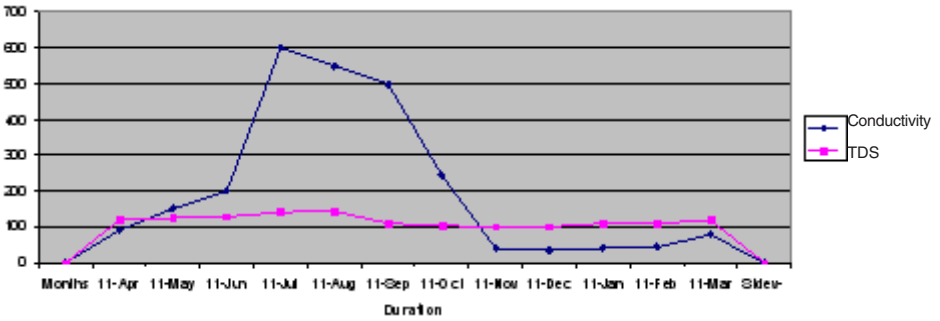

Fig. 2. Conductivity vs TDS of pond 2

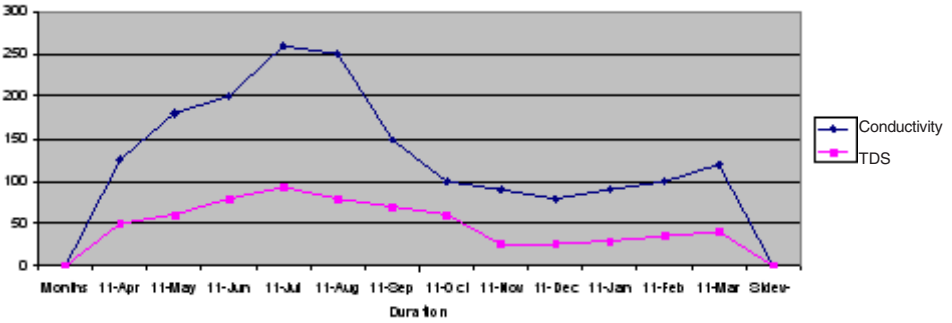

Fig. 3. Conductivity vs TDS of pond 3

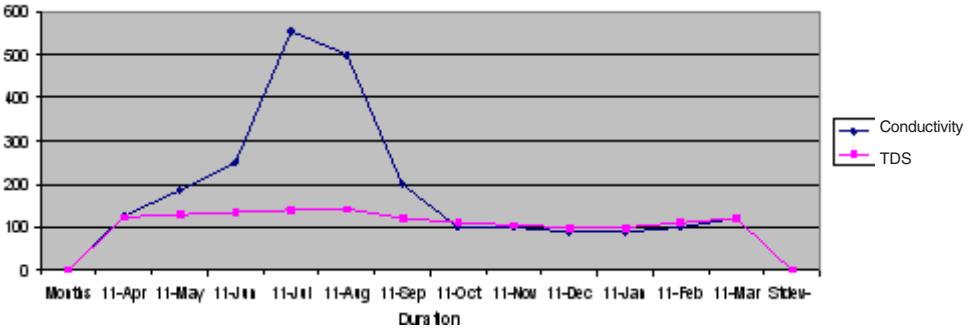

Fig. 4. Conductivity vs TDS of pond 4

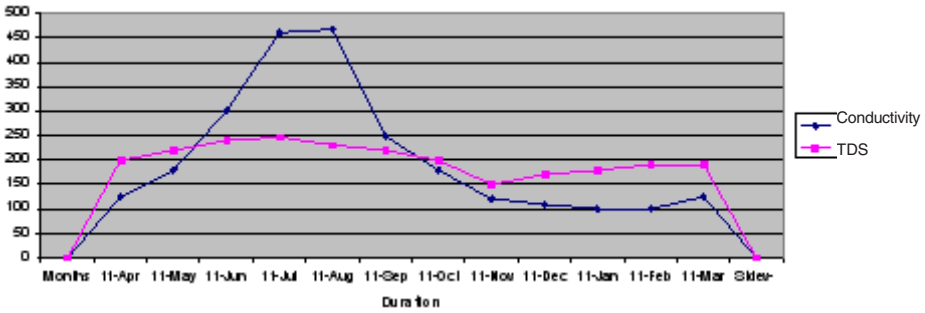

Fig. 5. Conductivity vs TDS of pond 5

components) when washed into the water. On the other hand, streams that run through areas with clay soils tend to have higher conductivity because of the presence of materials that ionize when washed into the water. Ground water inflows can have the same effects depending on the bedrock they flow through.

Indirect effects of excess dissolved solids are primarily the elimination of desirable food plants and habitat-forming plant species. Agricultural uses of water for livestock watering are limited by excessive dissolved solids and high dissolved solids can be a problem in water used for irrigation.

The monthly values of conductivity and TDS are given in table 1. The conductivity were found to be in the range between 100-123µmhos/cm at pond 1, 100-143µmhos/cm at pond 2, 21-93 µmhos/cm at pond 3, 100-247 µmhos/cm at pond 4 and 100-143 µmhos/cm at pond 5. The maximum conductivity was recorded during the summer season while minimum during winter season. Bhatt et al. (1999) observed the highest conductivity values in the month of May and lowest in the month of December from Taudaha lake. The increase in the value of conductivity during summer may be due to low water level input of large amount of salts from the adjacent agricultural fields (Sharma and Rathore, 2000).

The TDS Values were ranged between 35 to 195mg/l at pond 1, 40 to 245 mg/l at pond 2, 90 to 260mg/l at pond 3, 90 to 553mg/l at pond 4 and 100 to 466mg/l at pond 5. The maximum values of TDS occurred during summer and monsoon months while minimum during winter months. Qumerunsisa(1985) found the maximum TDSduring summer season and minimum during monsoon months. Sakhare and Joshi (2003) also found the higher value of TDS during summer months.

During study a positive correlation was observed between TDS and conductivity. TDS showed a positive alliance with electrical conductivity (Wiiliams, 1966; Khan and Khan, 1985 and Kumar & Paul, 1990).

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