Biological and Physico-Chemical Studies Of Some Wetlands in Balrampur, District Of Uttar Pradesh

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Summary: *Balrampur district with an estimated population of above approximately 15 lakh has many lentic water logging and deeper ditches in and around including Bhagwatiganj, Kuwana, Tulsipur, Rapti River, Sriganj, Utraula etc. These localities are presently under intense human activities due to which destruction of aquatic life is taking place rapidly. The present study was carried out to assess P^H, Turbidity, Free CO2, Calcium, Magnesium Hardness, Alkalinity, Sodium Potassium, Chloride Phosphate and Nitrate in different water bodies.*
Keywords: *Water quality, Physico-chemical, Water loggings, Wetland.*

I. INTRODUCTION

Water is the most necessary components for the living being. Life on the earth is never possible without water. Water is one of the most vital elements of the human environments. A man-made or natural water body is designated as a pond. Fresh water is elixir of life required for agriculture, industry and even human existence. Thequality of water depends on physico-chemical and biological characteristics which reflect on biotic status of the ecosystem. It is being used for many purposes as well as industrial water supply, irrigation, drinking, propagation of fish and other aquatic systems and generation of hydro-power plants. Water is the main source of energy and governs the evolution on the earth. 71% of earth surface is covered by water (C/A, 2008), 96.5% of the world's water is sea water which is salty that is not to be directly useful for irrigation, drinking, domestic and industrial purposes. 1.7% in ground water, 1.7% in glaciers and the ice caps. Less than 1% water is present in ponds, lakes, rivers, dams etc. which is used by man for industrial, domestic and agricultural purposes (Dixit *et.al.* 2015, Rani and Kumar 2010). World Health Organization (WHO, 1995) reported that contaminated water, inadequate sanitation and poor hygiene cause over 80% of diseases in developing countries. According to an estimates about 70% of all the available water in our country is polluted due to the discharge of effluents from industries, domestic waste, land and agriculture drainge (Srivastava and Kanungo, 2013, Khobargaddi *et. al.* 2001, Prasad *et.al.* 2008). Chemicals are a major source of water combination that introduced during water movement through geological materials (Kakaria *et.al.* 2011, Ajmal *et.al.* 1984, Arun 1949). Fertilizars and pesticides are major antibution to water pollution (Nag and Mukharjee, 1980, Q-Zhan *et. al.* 2006, Shetty *et.al.* 1998).

Needless to say, that the nature of soil is dependent on the quality of water entering into it. The biological and Physico-chemical studies of soil polluted with different industrial effluents revealed great changed in the characteristics of soil and wild vegetation. Several disease have been identified among the human beings, which are caused by using contaminated water also. Water borne diseases infections occur during washing, bathing and consumption of contaminated water during food preparations (Patil and Patil 2010, Kiran, 2010, Ramaknzhnan and Venkatacharya 2015, Arora *et.al.* 1973, 1974, Davis and Jaksnow, 1975, Tripathi, 1978, Bhattachry and Das 1980, okdeneagei *et. al.* 1984, Day, 1973, Bauwer and Chaney 1974, and Kumar, 1999).

The increasing industrialization, urbanization and development activities to cope up with the population explosion have brought inevitable water crisis (Rao and Rameshwari, 1998). The discharge of industrial effluents into the natural water body causes severe water pollution. Alteration in the chemical composition of natural aquatic environment by industrial effluents usually induces changes in the aquatic ecosystem particularly aquatic organisms. Large water loggings have very rich flora and fauna and consist of a number of ecosystems. However, increasing industrialization, urbanization, over exploitation and simultaneous disregard to the environmental degradation have completely destroyed several water bodies. Therefore,it is necessary to save the remaining precious biodiversities for survival of man and aquatic ecosystem.(Khan et al. 1994). Few researches (Kiran, 2010,Mangare *et.al.* 2010, Raut, 2011, Tripathi 2012, Naik *et.al.* 2012, Balekhar and Ther, 2013, Mahajan and Tank, 2013,) in different regions of India have been studied the biological and physic-chemical parameter of the various water bodies, But it seems that there are scanty reports There are limited reports regarding the water quality of these water loggings therefore the present study was carried out to determine the quality of water to assess the pollution loading to water loggings.

II. MATERIALS AND METHODS:

Balrampur district is situated above 143 metre above sea level between 27.45-28.10^0 North latitude and 82.30-83.13^0 east longitude. The important water loggings are Suwano Nala Bhagwatiganj, Rapti River, Tulsipur Pond, Shriganj Utraula Pond, Kuwano Forest River. The water samples of different localities were collected during the month of July and August 2016. Different Physico-chemical analysis were carried out as per standard methodology (APHA, 1985, Trivedi & Goel 1986, Wetzel et. al. 1991).All analysis were performed in triplicate and an average of that considered.

III. RESULTS AND DISCUSSIONS:

The results of present studies are recorded in Table-1. During the experiment it was observed that the temperature of different localities/wetlands showed variation in relation to the environmental temperature which were in range of 30.5^0 C-21.7^0 C. The P^H of Kuwano Forest River was recorded 9.2 (Maximum) while at Tulsipur 6.9 (Minimum) due to the algal bloom which prevented the formation of Carbon dioxide. However, in other water loggings the P^H showed marginal changes and remained around normal valueChoudhary et al. (2014). The conductivity value of all sites were low except that of Tulsipur Pond where the value was high indicating the concentration of total dissolved solid, Calcium, Magnesium hardness, Sodium, Potassium and Chloride ions. The turbidity value of Tulsipur Pond and Shriduttganj Pond were recorded higher than at other localities. Higher alkalinity value of Suwano Nala Bhagwatiganj and Tulsipur Pond were due to addition of large amount of water from domestic and industrial sources. The water of Kuwano Forest River and Rapti River had high concentration of DO which favours water quality and aquatic life. High load of Nitrate was recorded in Kuwana Forest River and Suwano Nala Bhagwatiganj while Tulsipur Pond and Suwano Nala Bhagwatiganj showed maximum concentration of Phosphate revealing high concentration of nutrients that would favour few organismsleading the destruction of biodiversity affecting the ecosystems. Maximum electrical conductivity was recorded in theTulsipur pond whereas minimum was in Suwaon Nala water ofBhagwatiganj Balrampur. Kataria et al. (2011), and Shrivastava and Kanungo (2013) also reported a range of EC in between 296 to723μmhos/cm and 115.11 to 212.13 μmhos/cm respectively.

The study revealed some information in relation to water quality of the important lentic water bodies of Balrampur district (Srivastava & Tewari 2005). The study noted that the Tulsipur Pond was extremely polluted in comparison to other water bodies where the pollution loads marginal. A comprehensive study recorded the water quality parameter.Physico-chemical, Biological and Bacteriological studies of water were also carried out (Kanthikayani et.al. 2002, Padma and Pariakali 1999).Similar results were founds by different workers (Garg et, al 2006, Tewari et,al. 2007,Chaudhary et,al.2014).

In the present study, natural resources of water bodies such as pond which is facing serious pollution due to increased invading human and animal wastes.The results of the study revealed that the selected pond is found to be highly polluted and not suitable for use of mankind.The present study emphasized the need for further study of aquatic ecosystem for proper management and survival of aquatic life and ecological balance.

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.**Table-1** Water quality characteristics of different water bodies in Balrampur district (July- August 2016).

S.NO.	Parameters	Suwano Nala	Rapti River	Tulsipur Pond	Shriduttganj Utraula pond	Kuana Forest River
1	Temperature	30.5	27.5	27.8	28.0	21.7
2	P^H	8.3	7.6	6.9	7.8	9.2
3	Conductivity	180.5	225.4	321.6	247	248
4	Turbidity	10.5	17.2	50	39.5	20
5	T.D.S.	117.1	116	121.5	138	138
6	D.O.	5.2	6.9	6.8	3.5	7.8
7	Free CO_2	4.3	3.7	4.5	4.3	3.8
8	Alkalinity	100	85.5	96.2	88.3	84.0
9	Ca hardness	48.0	58.3	57.2	59.2	51.5
10	Mg hardness	6.3	13.8	15.2	17.4	14.1

11	Chloride	30.4	29.8	11.8	26.8	37.5
12	Sodium	3.3	3.2	2.5	3.6	2.7
13	Potassium	1.2	1.4	1.0	3.8	1.3
14	Nitrate	10.5	1.0	9.8	1.8	14.0
15	Phosphate	2.0	1.38	2.2	1.08	1.37

Except Temperature, P^H, Conductivity, Turbidity all other parameters are expressed in mg./lit.
(Data in table is statistically verified and an average of five readings).

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