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A Comprehensive Study of Pollution in Underground Water in Ballia

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ABSTRACT

The present paper deals with the surface and underground water quality with respect to physio chemical characteristics i.e pH, Temp. , alkalinity, total dissolved solids(TDS)etc. The work has been carried out in Ballia District covering the sites viz River Ganga at Mahavirghat and Lakda Nallah At Singhapur for surface water analyses and samples of bore wells at Singhapur, hand pumps and supply water at Chandra shekhar nagar. The Samples were studied on Jan 24 & 27, 2015 and a few of the pollutant parameters were investigated on the spot. The physico chemicals properties show that the temp. TDS, alkalinity and hardness depend upon the sewages and effluents, which mix into the water bodies. The pH increase due to addition of domestic and industrial wastes discharged into water bodies, whereas the hardness (total hardness , calcium and magnesium hardness),. Due to presence of NO_3 the surface water bodies rich with algal blooms and become lesser where industrial and domestic wastes .

Introduction

The effect of chemical pollutants on health is not well understood. Even information on the identity and amount of the chemicals . That are present in incomplete, although the use of chemical products every where is on the increase. Some natural waters are known to have injurious chronic effect from prolonged use. Therefore, chemical contaminants that may enter the water supply from sources such as sewage effluents, the recycling of treated wastes, or percolation of wastes in to the underground water supply should be under suspicion until proved to be harmless by experiments with laboratory animals . Several waterborne infections diseases are directly related to polluted water. In addition, the aquatic food chain acts to concentrate several toxic substance and it ascends from micro organisms through various predators and prey to fish eaten by seals, by certain birds or by people. Organochloride and organomercury pesticides, PBCs and some radioactive pollutants are confentrated this way. Well water contaminated by nitrates from fertilizer run of posses a hazard to health particularly for infants.

The inland freshwater ecosystems are being increasingly subjected to greater stress from various human activities (National Academy of Sciences, 1969;Duncan &Rzoska, 1980 and Rao , 1975). Water of river Ganga flowing through Ballia District of Uttar Pradesh is extensively used for domestic municipal agricultural etc. purposes.

The enrichment with nutrients occur due to the disposal of domestic and farm sewages, industrial effluents and form the run off from surrounding areas causes eutrophication .The Domestic sewage and industrial effluent etc do not only affect the characteristics (physico chemical &biological) of surface water but it also affect the properties of ground water . The

domestic sewage is disposed off either into underground water through soak pits or into surface water bodies. There have been numerous investigations on the impact of domestic sewage changing the physico chemical and biological characteristics of fresh water in Europe & America . In India also few workers like Sastry et. Al (1972) and Arora et.al (1973) Have worked on the same problems.

The fundamental physico chemical properties of water depend largely on the components present in dissolved form in water. The presence of organic matter in water bodies together with inorganic paniculate debris produces stable chalets of trace metals and prevents their precipitation as insoluble inorganic salts (Groth, 1971) Most organism can accumulate metals as co factor in several enzyme systems including those involved in respiration and nitrogen metabolism.

The problems of surface water in ballia are enriched with nutrients causing eutrophication while the ground water is enriched with minerals. The river water quality is degrading leading to a pre dominantly unfavourable environment for its inhabitants Government of India launched a series of action plans to control the Ganga Water Pollution and improve water quality (Krishnamurthy et. Al 1991)

MATERIAL AND METHODS

Depth temperatures are measured by a number of devices such as thermister, thermophone,bathy thermograph, reversing thermometer etc. Thermister is based on the principle of developing different intensity of charges on a resister in different temperatures. In bathythermograph, a copper tubing is filled with xylene which expands or contracts and activates as a special element carrying a stylus. The stylus records on a coated glass slide, the movements of the element

For the analyses of correlation among surface and underground water resources five different sites were selected

SITE 1 – (Surface water)
Sampling site is Mahavir Ghat of River Ganga, Ballia

SITE 2 – (Surface water)
Lakda Nallah, Singhapur

SITE 3 – (Underground water)
Hand pumps of Chandra Shekhar Nagar Baliia

SITE 4- (Underground water)
Supply water (Tap water) Chandrashekhar nagar and Ballia

SITE 5 – (Underground water)
Samples of Borewell of Singhapur

Water Samples were taken from different sites at different spots and mix them gently for further analyses

The Temperature was recorded by laboratory thermometer . The pH was observed by portable digital pH meter. Hardness & Calcium l parameters were analyzed as per methods described in the standard methods (APHA, 1985) and by using laboratory manual (Mathur, 1985)

RESULTS AND DISCUSSIONS

Some important physico-chemical and biological properties of water depicted in Table-1 and Table-2.Temperature increases according to the depth of water resources (Table-1). In this table the temperature of Lakda Nallah and River Ganga are 17.5 degree celsius each,where as the temperature of Bore-well water sample is maximum i.e.20.1 degree celsius . The pH was on alkaline side in the samples of river Ganga and Lakda Nallah due to addition of industrial and agricultural wastes. People take holy bath in river Ganga ,is also one of the most

important reason of increasing the pH ,which is controlled in underground water resources (Table -1 & 2) Dissolved Oxygen provides more information about the nature of water of different samples for instance the DO increasing in surface water resources i.e 4. 5 mg/L to 5.5 mg/L (Table-1&2)

The maximum value of Nitrate is recorded in Lakda nallah 385 mg/L and 308 mg/L respectively while the lesser amount of Nitrate at different sites vary but higher in surface water causes eutrophication and lesser in underground water. The Turbidity was greater in supply water at Ballia.

TABLE-1

Physico- Chemical and Biological Properties – (Dated: Jan 24, 2015)

Characteristics	Sources of water				
	Lakda Nallah	River Ganga	Hand Pump	Tap Water	Bore Well
Temp.	17.5	17.5	19.2	18.7	20.1
pH	8.51	8.06	6.92	7.54	7.05
T.Hard	135	134	313	188	308
Calcium	95	93	219.1	131.6	215.6
Alkalinity	155	265	415	340	493
Turbidity	4.5	1.2	1.35	11.5	1
Nitrate	383	480	9	8	6

TABLE-2

Physico- Chemical and Biological Properties – (Dated: Jan 24, 2015)

Characteristics	Sources of water				
	Lakda Nallah	River Ganga	Hand Pump	Tap Water	Bore Well
Temp.	18.2	17.9	20.1	19.8	21.5
pH	8.48	8.15	7.05	7.5	7.23
T.Hard	142	152	310	180	303
Calcium	99.4	106.4	217	126	212
Alkalinity	151	270	400	352	399
Turbidity	4	1.4	1.4	10.82	1.8
Nitrate	385	481	8	8	7

Among the physical factors temperature plays an important role in growth distribution of aquatic macrophytes (Spence &Dale, 1978). This is one of important factors influencing altitudinal , lattitudnal and in depth variations of the distribution of aquatic species as also suggested by Aiken and Gillet(1974) and Barko et. Al (1982). The temperature of the surface water is significantly correlated with ambient temperature. PH plays significant role in the metabolic activities of aquatic macrophytes. Increasing of pH is due to anthropogenic activities e. g agricultural operations, industrial effluents etc. Due to high pH the production has been shown high (Srivastava, 1989). Nitrate values favor in lush green patches of tolerant macrophytes and cause of eutrophication.

CONCLUSION

The correlation between surface and underground water indicates that the surface water is polluted mainly by anthropogenic activities like agricultural operations use of fertilizers pesticides and addition of industrial effluents. According to this study we should adopt some remedial measures like to educate the people towards the use of water. Not a single drop of waste water should reach into the river without treatment and a complete common wastewater treatment plant should be established in Ballia. To maintain the physical status our tomorrow should not be bustar.

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