



## EVALUATION OF GROUND WATER QUALITY OF KASGANJ TOWN IN SUMMER

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### ABSTRACT

The Kasganj is a subdivision of Etah District (Now Known as District Kaganj) which is known for the manufacture of big cooking iron wares and kitchen utensils and is seat of small scale industries. However, there is no proper sewer system in the town and industrial effluents are allowed to flow over the roads and streets, consequently endangering the ground water quality.

In order to assess the extent of ground water pollution physico chemical investigations of ground water was undertaken during summer. For this purpose six sites-Gangeshwar Colony, Aroly, Chitragupta Colony, Durga Colony, Nathuram Mohalla and Nawab Mohalla were selected for study.

The Parameters which were determined are Colour, Taste, Odour, Temperature, pH, Conductivity, Turbidity and contents Total solids, Suspended solids, Settable solids, DO, BOD, COD, TKN, BHC. The water Samples were also analysed for the determination of Calcium, Magnesium, Chloride, Sulphate, Caarbonate, Nitrate, Sodium, Potassium and free CO<sub>2</sub>.

The level of those parameters and contents were evaluated over all the six sites and results were lowest at site-4 (Durga Colony) and highest at site-3 Chitragupta Colony) in the summer.

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### INTRODUCTION

The term pollution derived from the latin word pollure and means to soil<sup>1</sup> or to defile. The term pollution, contamination, nuisance and degradation often are used simultaneously to describe faulty conditions of surface waters. Pollution have defined as an unavoidable<sup>1</sup> change in Physico - chemical and biological characteristic of our air, land and water that may or will hostilely affect human life or that of other describe species or industrial process or deteriorate our natural resources.

Pollution of water is responsible for<sup>2</sup> a very large number of mortalities and incapacitations in the word. Polluted state of water resources has led to a steady decline in fisheries and has also affected the irrigation land. Water no longer remains a free good. Availability of clean water is going to become the greatest `constraint for the development of tomorrow.

Man has tried to cope with this scenario and has rapidly advanced its efforts to counteract this malady. In past few decades<sup>3</sup> natural and polluted waters have been studied in detail all over the world and considerable data is now available on most kind of pollutants and their effect on ecosystem as well as on organisms.

Sources of pollution can be divided into two groups natural and cultural. The sources can be further classified as either point or non point. Point sources enter the pollution transport routes at discrete unidentifiable locations and usually can be measured directly or otherwise quantified and their impact can be evaluated directly. Pollution from non point sources can be related to weathering of minerals, erosion of virgin lands and forests including residues of natural vegetarian or artificial or semi artificial sources. The last can be directly related to human activity such as fertilizer applications or use of agricultural chemicals for controlling weeds or insect erosion of soil materials from agricultural farming areas and animal feed lots, construction sites, transportation of dust and litter on impervious urban surfaces.

Ground water is usually traced back to four main origins. Industrial domestic agricultural, environmental pollution, each family is being divided up into continuous and accidental types.

#### Experimental and Discussion in the month of May

In this month temperature ranged between 30.10-30.80°C. Temperature in this month has not shown remarkable change at any site. Highest value was recorded at site III (Chitragupt Colony). pH of water dependent upon the relative quantities of CO<sub>3</sub><sup>2-</sup>, HCO<sub>3</sub><sup>-</sup> and Ca<sup>++</sup> (Zafar,1996). In this month the six sites pH followed the order site-III> Site-I >Site- II> Site-

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VI>Site>V Site IV. It ranged between 7.52-8.02. It was found maximum at site-III (Chitragupta Colony) and minimum at site-IV (Durga Colony).

In this month Conductivity fluctuated between 649.00-671.00 us/cm. Lowest value was recorded at site-IV (Durga Colony) and highest at site-III. (Chitragupta Colony). Obviously dissolved solids are in high concentration at site-III (Chitragupta Colony). At the six sites it followed order site - III>site-V>site-I>site-VI>site-II>site-IV.

Turbidity ranged between 5.27-14.90 NTU. Highest value of turbidity was recorded at site III (Chitragupta Colony) and lowest at site IV (Durga Colony). It followed the order site-III>site-VI>site-II>site-V>site-I>site-IV. Turbidity was under the permissible limit for drinking water at the sites I,II,III and IV.

Calcium content at the six sites followed the order site-III>site-VI>site-V>site-I>site-II>site-IV. It fluctuated between 90.04-99.29 mg/l. Highest value was recorded at site- III (Chitragupta Colony) and lowest at site- IV (Durga Colony). It was under the permissible limit for drinking water (200mg/l, ISI, 1991) but exceeded the desirable limit (75mg/l, ISI, 1991) at all the six sites.

Magnesium content followed the same order as calcium (site-III>site-VI>Site-V>site-I>site-II>site-IV). It ranged between 61.80-74.40 mg/l. Highest value was recorded at site- III (Chitragupta Colony) and lowest and site-IV (Durga Colony). It was above the permissible limit for drinking water (30 mg/l, ISI, 1991) at all the six sites.

The concentration of total solids ranged between 658.00-706.00 mg/l. The highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). At the six sites it followed the order site III>site-VI>site-V>site-II>site-I>site-IV. Total solids contents were above the desirable limit 500 mg/l at all six sites. Actually in many parts of the world; water with dissolved solids concentration ranging from 2000-4000 mg/l is also used and no psychological effect were reported.

Suspended solids ranged between 21-25.8 mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site- IV (Durga Colony). It followed the order site-III>site-VI>site-V>site-I>site-II>site-IV.

Settleable solids varied from 6.10-9.50 mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). It followed the order site-III>site-VI>site-V>site-I>site-II>site-IV.

The chloride content followed the order site-III>site-VI>site-I>site-V>site-II>site-IV. In this month it varied from 351-368mg/l. normally increases as the mineral content increases. It is found in the form of Na, K and La salts. It shows the degree of pollution of animal origin. In this month it varied from 352-368 mg/l. The lowest value was recorded at site-IV (Durga Colony) and highest at site-III (Chitragupta Colony). At all sites chloride content surpassed the limit for drinking water (250mg/l, ISI, 1991) but was found under the permissible limit for drinking water (1000mg/l, ISI, 1991). Klien (1957) found direct correlation between ahlride and pollution load.

Stiever (1967) has reported that the sulphate reduces to H<sub>2</sub>S very quickly under high organic pollution and depleted

oxygen conditions. It followed the order site-III>site-VI>site-V>site-I>site-II>site-IV. In this month sulphate content ranged between 163.00-178.00 mg/l. Highest value was recorded at site - III (Chitragupta Colony) and lowest at site-IV (Durga Colony). In this month it was found within the permissible limit (400 mg/l, ISI, 1991) at all sites.

Carbonate at the six sites followed the order site-III>site-VI>site-V> site-II>site-I>site-IV. It varied from 5.26-7.76 mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony).

Bicarbonate followed the order site-III>site-VI>site-V> site-I> site-II> site-IV. It varied from 582-621mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony).

Free CO<sub>2</sub> followed the order site-III>site-VI>site-II>site-V>site- I> site- IV. It varied from 10.90-14.60 mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). Water at all sites is corrosive in nature as CO<sub>2</sub> always exceeds the limit (6mg/l, Kudesia, 1991). The high CO<sub>2</sub> level here is an indication of pollutants in water and not much harmful for aquatic life. The higher value of free CO<sub>2</sub> might be due to increased rate of decomposition of organic matter by microbes in bottom resulting in the rapid production of free CO<sub>2</sub>.

In this month nitrate fluctuated between 14.00-20.01mg/l. It followed the order site-III>site-VI>site-V>site-I>Site-II>site-IV. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). Site-III is situated near the open ground which is suitable for agriculture. Its highest value at site-III was due to the influx of nitrogenous fertilizers through agricultural lands.

Nitrite fluctuated between 1.63-5.10 mg/l. It followed the order site-III>site-VI>site-V>site-II>site-I>site-IV. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). At the site I, II, IV nitrite content was found under the provisional guidelines for drinking water (3mg/l, WHO, 1996).

Sodium varied from 346-372 mg/l. It followed the order site-III>site-II>site-VI>site-V>site-I>site-IV. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). No permissible limit has been prescribed of sodium for drinking water.

The concentration of potassium is trivial in most drinking waters. It fluctuated between 7.78- 9.98.00 mg/l. It followed the order site-III>site-VI>site- V> site-II>site-I>site-IV. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony).

DO in this month followed the order site-III>site-VI>site-V> site-II>site-I>site-IV. It varied from 5.22-7.91 mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). DO at the sites, I, IV was found below the minimum desirable limit 6 mg/l for drinking water (1991).

BOD in this month fluctuated between 9.50-11.51 mg/l. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). It followed the order site-III>site-VI>site-V>site-II>site-I>site-IV. BOD at all sites exceeded the maximum permissible limit of 2mg/l for drinking water. Ostensibly cause of the high BOD i.e. organic

pollution at the site-III (Chitragupta Colony) is a big sewage disposal, drain sides of which are thickly inhabited by people of lowest middle class who have installed hand pumps in their houses for maintaining their need of potable water and water for cleaning purpose. BOD is lowest at the site-IV (Durga Colony) because at this site the community habits are comparatively neat and clean.

COD in this month followed the order site-III>site-VI>site-V > site- II> site- I > site- IV. It fluctuated between 65.58-85.52 mg/lit. Highest value was recorded at site- III (Chitragupta Colony) and lowest at site- I (Gangeshwar Colony).

TKN followed the order site-III>site-VI>site-V>site-II->I>site-IV. It varied from 10.24-14.75 mg/lit. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). It is lowest at site-IV because it is least dirty and maintaining some hygiene and community habits are comparatively neat and clean.

In this month water was found to be colourless at sites II, IV, V and light yellow at sites I,VI,III. Light yellow colour of water indicates the presence of sand. Taste of water in this month was agreeable at sites I, IV,V and disagreeable at sites I, III, VI.

Odour in this month was unobjectionable at sites I, IV,V. and objectionable at sites II, III, VI.

Similarly various parameters and contents were determined and discussed in the month of March earlier.

### Summary

Durga Colony (site-IV) is marked with qualities of adequately clean water. Worst affected is Chitragupta Colony (site-III) due to the bad community habits, rivulets and gutters delivering fifthly and boggy water, a big sewage disposal drain is going through middle of the colony, sides of which are thickly inhabited by people of lower middle class; who have installed hand pumps in their houses for meeting their needs of potable water and water for cleaning purpose.

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