



## Evaluation Of Ground Water Quality Of Kasganj Town In Winter

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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 winter. 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 winter.*

**Introduction:** The term pollution derived from the latin word pollure and means to soil 1or 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 nonpoint 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 November:** In this month temperature was found maximum 24.90 °C at site VI (Nawab Mohalla) and minimum 24.00 °C at site-IV (Durga Colony). It is very important to know temperature is an important factor to influence the biological reaction in water. Higher values of temperature augment the chemical reaction and reduce solubility of gasses and dissolved oxygen.

At the six sites pH followed the order site-III> Site-I >Site- II> Site-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 quantum of filth is quite high in this colony. Hand pumps are installed by the side of gutters where animal and vegetable waste is scattered all along the sides of these gutters. Peels of vegetable, fruits and morsels of edibles make the soil alkaline resulting increase the measured pH value.

Conductivity is a measurement of the dissolved solids in us/cm. No permissible limit has been decided for this. In this month Conductivity ranged between 650.00-668.00 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 varied from 5.28-14.70 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-V>site-II>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-II>site-I>site-IV. It fluctuated between 90.10-97.40 mg/lit. 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/lit, ISI, 1991 but exceeded the desirable limit (75mg/lit, ISI, 1991) at all the six sites.

Magnesium content followed the same order as calcium (site-III>site-VI>Site-V>site-II>site-I>site-IV). It ranged between 64.40-68.90 mg/lit. 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/lit, ISI,1991) at all the six sites.

The concentration of total solids ranged between 655.00-702.00 mg/lit. 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/lit at all six sites. Actually in many parts of the world ; water with dissolved solids concentration ranging from 2000-4000 mg/lit is also used and no psychological effect were reported . Suspended solids varied from 21-25 mg/lit.

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 6.54-9.38 mg/lit. 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-V>site-II>site-I>site-IV. It 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/lit. 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/lit, ISI, 1991) but was found under the permissible limit for drinking water (1000mg/lit, ISI, 1991). Klien (1957) found direct correlation between ahloride 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/lit. 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/lit, 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 5.22-7.70 mg/lit. 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 578-623mg/lit. 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 10.44-14.82 mg/lit. 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/lit, 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 14.18-19.60mg/lit. It followed the order site-III>site-VI>site-V>site-I>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 1.64-4.82 mg/lit. 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/lit, WHO, 1996).

Sodium controls the acidic basic

equilibrium. It is mostly associated with the chloride and bicarbonate ions. Sodium content fluctuated between 346-368 mg/lit. 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 8.20- fluctuated between 9.98.00 mg/lit. 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 5.22-7.82 mg/lit. Highest value was recorded at site-III (Chitragupta Colony) and lowest at site-IV (Durga Colony). DO at the sites, I, IV wasfound below the minimum desirable limit 6 mg/lit for drinking water (1991). BOD in this month fluctuated between 9.52-11.49 mg/lit. 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/lit 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. Site-VI (Nawab Mohalla) is densely populated by the people of non vegetarian habits lacking adequate proper hygiene. Animal waste is disposed into the gutters hardly disilted and cleaned by the municipal sanitary labour and scavengers. Moreover the faculty and careless installation of hand pumps is another nuisance to the physico-chemical qualities o potable water drawn from these hand pumps. Site-V (Nathuram Mohalla) is also a congested place. Resident of this mohalla too are careless about maintaining the sanitation of the area. Municipal authorities are also lukewarm to maintaining proper hygienic conditions therein. Vegetable and animal refuse heaped around the hands pumps. Such an insanitation also augments soil and water pollution. Site- II (Aroly) too does not have adequately educated inhabitants.

They too are nonchalant towards maintaining the sanitary conditions at this site. The area all around is precipitous with deep pits in the roads wherein water is logged posing health hazards and decadence of vegetable waste.

COD in this month followed the order site-III>site-VI>site-V > site- II> site- IV > site- I. I fluctuated between t 68.75-87.60 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 10.28-18.80 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 I, IV, V and light yellow at sites II, III,VI. 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 II, 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 January also.

**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.

### REFERENCES

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