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Environmental Effects on Physico-Chemical Characteristics of Drinking Water at Banda (U.P.) India

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Abstract: ***Assessment of Physico-chemical Parameters viz colour, odour, turbidity, PH, total alkalinity, total hardness, total dissolved solid dissolved oxygen, river water & tubewell water were determined in rainy season 2014. Samples were taken from eight points in the entire city. Water is the major part of the environment. Pollution of water bodies is one of the major concern to environmentalists. Water quality is an index of health and well being of the society. The various pollutants the water resources quantitively and qualitively. Besides, meteorological conditions viz photo period, atmospheric temperature rainfall and relative humidity were also recorded monthly as they have direct impact on water bodies, Results further in distribution system due to leakages in pipe lines chlorides was observed (surface water) supply is qualitatively better than tube wells (ground water) supply. The values of parameters are compared with standard given by BSI/ W.H.O.***

Keywords: BSI/W.H.O, Physico-chemical Parameters, River & Tube well, Potability of water Environment.

1. Introduction

Potable water is essential for the well being of all the peoples. It is a natural resource and is a major part of the environment. The availability of it is in the form of surface and ground water, which covers nearly 73% of the earth. Surface water is in two forms (i) marine Water (ii) fresh water, Marine water acquires a major volume approximately 94.47%, whereas Fresh water is only 2.53% out of which 1.76% of it is frozen in the forms of ice and glaciers. Hence it is not available for human beings. Obviously remaining 1% of it is only available for the human beings. In India per capita diarrohoel disease kills 6,000 children's every day apart from millions who are debilitated because of water born diseases which hinder their education and impair their ability to a decent livelihood in the future, (Business India, December, 2003).About 200 millions (an estimated 90%) of the country's water resources are polluted with untreated industrial and domestic wastes, pesticides, fertilizers and geogenic chemicals, (www.teriin.org/energy/water.htm).

Due to unpotability of drinking water ground water is also an essential part for fulfilling the requirement of drinking need, besides irrigational and Industrial use. However, due to rapid growth of population, urbanization, industrialization and agricultural activities ground water resources are under stress. There is growing concern on the deterioration of ground water quality due to geogenic and anthropogenic activities. Unfortunately in many countries around the world, including India, drinking water supplies have become quite contaminated due to polluted water. Which has ill impact on health. Both the surface and ground waters become polluted due to chloride, nitrate, sulphate, due to sewage waste, municipal waste, organic waste and Industrial effluents eh. Bharadwaj (2005) reported that the contaminated water not only affects the health of the public but also the consumption of polluted water may cause various water born diseases such as diarrhoea, dysentry, skin diseases, teeth decay, and other obdominal diseases.

Banda city under study is situated in south central part of U.P. and northern part of Bundelkhand region surrounding Vindhya range. The city Banda is the Head Quarter of chitrakoot dham Mandal. comprises of chitrakoot (U.P.), Mahoba, Hamirpur and Banda Districts. The topography of it is undulating and is plateau. The variation of temp. is from 8^0C to 48^0C over the year. Which is located between 23.8 - 23^0 30 N latitudinal 78^0 11" - 81^0 30' E longitude.

The drinking water supply in Banda City is through river Ken and tube wells. The surface water supply resource is river Ken which is located on western side of the city. The supply is from upstream. As regards the underground water are tube wells, the water strata is very deep due to rock strata.

The water in supply system is treated with chlorine and also filtered as per the water worksnorms. To provide good quality water to consumers It should be analysed for of Physico-chemical Parameters to assess the drinking water quality and proper measures are to be adopted for the suitable quality of water in distribution system. As regards this in the present study the abiotic factors of drinking water in both surface and ground waters are analysed and the deficiencies are painted out besides the proper measures are suggested for the potability of water, which will be inwell being of the human health. The entire city comprises twenty five wards which will be extended shortly to twenty eight wards. They are divided in Four zones. Zone number One. Bombeshwar and Second. Katra, which are supplied by river Ken water. Whereas Zone Third, Civil Line and Four, Aliganj are supplied by tube wells. Regarding both the supplies are for 1- $1^{1/2}$ hours in morning. Only so shortage of water availability besides, the supplied water is contaminated which is injourious for human health.

Table 1: Sources of different water samples collected in Banda City U.P., India

Sample No.	Location	Source
S1	Civil Line	Ground water
S2	Gayatri Nagar	Ground water
S3	Chausath Yogni	Ground water
S4	Aliganj	Ground water
S5	Katra	River water
S6	Bakerganj	River water
S7	Mardan Naka	River water
S8	Kailashpuri	River water

Table 2: Rainy Season 2014-2015
Physico-chemical Parameters of different water samples

Sample No.	*Taste*	*Odour*	*Colour*	*Terbidity (NTU)*	*P^H*	*TDS Mg/Lit*	*Residual Chlorine Mg/Lit*	*DO Mg/Lit*	*Fluoride Mg/Lit*	*Chloride Mg/Lit*	*Total Hardness Mg/Lit*	*Conductivity Micro/mho*
S1	Slightly Sweet	Odourless	Clear	1.5	7.9	286	1.0	8.2	0.26	158	162	440
44	Unsatisfactory	Sour	Muddy	2.2	8.4	552	1.4	7.6	0.40	190	250	675
S3	Unsatisfactory	Sour	Muddy	2.5	8.5	561	1.3	7.4	0.41	200	260	685
S4	Slightly Sweet	Odourless	Clear	1.6	7.2	270	0.9	8.4	0.24	160	167	415
S5	Slightly Sweet	Odourless	Clear	1.0	7.6	156	1.0	8.5	0.12	116	114	240
S6	Unsatisfactory	Sour	Muddy	2.2	8.3	190	1.0	7.2	0.44	175	280	625
S7	Unsatisfactory	Sour	Muddy	2.6	8.6	221	1.5	7.5	0.45	180	300	522
S8	Unsatisfactory	Sour	Muddy	2.3	8.7	224	1.4	7.4	0.45	170	310	550

2. Material and Methods

Sample Collection:-
Total Eight water samples were collected in rainy season 2014, from different locations (civil line,Gayatrinagar, Chausath Yogni, Aliganj, Katra, Bakerganj, Mardan Naka, Kailashpuri) in Banda city (Table-1) All the samples were collected in sterilized bottles Do bottles and were stored at 4^0C till further investigation.

Physico-Chemical Parameters:
Abiotic Parameters viz Turbidity, colour odour, taste, PH, hardness, total dissolved solids, chlorides, and Dissolved Oxygen were analysed as per the Methods given In APHA (2005).

3. Result and Discussion

The examined physico-chemical parameters showed considerable variations in different samples. The observations are depicted in table-2
PH: The effect of P^H on the chemical and biological nature of water makes for determination is very important. It is defined as-log[H^+], and measured as intensity of acidity or alkalinity on a scales ranging from 0-14. The free H^+ are more it is expre ssed acidic (i.e. P^H <7), while more OH^- ions is expressed as alkaline (i.e. P^H >7). P^H value of surface and grownd water ranged from 7.2 to 8.7. The acidic medium of water is quite harmful. Whereas alkaline medium above 7 to 9.5 is suitable for fish culture and other biota.

Turbidity:
It shows light - transmitting properties of water and is comprised of suspended and colloidal material, which is concerned with health. This is unsafe for consumption and industrial use also. In the course of study turbidity was observed 1.0 to 2.6 N.T.U.

Odour
It is felt in coloured water which is unsuitable for drinking. The cause is the leaching organic materials and chemicals near water resources. As S1,S4,S5 water was odourless , whereas S2,S3,S6,S7,S8 it was of sour taste.

Colour
Any colour of water provides unpotability because the cause of it is organic materials, chemicals , whereas clear water /no colour in water is suitable for drinking. In the course of study the coloured water was observed at stations S1,S4,S5,whereas no colour / clear was noticed at stations S2,S3,S6,S7,S8.

Conductivity
Electrical conductivity is a measure of water capability to transmit electric current and also it is a tool to assess the purity of water. conductivity was found in the range 240 to 685 micro/ mho. One of the reason of salinity is the high concentration of cat ions such as Na,Ca and Mg whereas chloride, phosphate and nitrate as anions and further it is noted that the electrical conductivity is higher in the rainy season.

Total Hardness
It is an important parameter in decreasing the toxic effect. During the course of study it was found to be in the range of 114-310 mg/lit. which is within the desirable limit as compared with BIS.

TDS
These are in dissolved state in solution. water with high dissolved solids generally are of inferior potability and may induce an unfavourable physiological reaction in the transient consumer. The TDS of all the samples were in the range of 156-561 mg/lt.

D.O.
Dissolved oxygen (DO) ranged from 7.2 - 8.5 mg/lit. It may be present in water due to direct diffusion from air and photosynthetic activity of autotrophs in surface water. Concentration of D.O is one of the most important parameters to indicate water purity.

Residual Chlorine
It is well known disinfeciting agent which is used to kill all the microbes present in drinking water. Residual chlorine was found to be in the range of 0.9 - 1.5 mg/l. Excess of chlorine gives pungent order to the water supplied.

Fluoride
Its high concentration causes dental fluorosis and lower concentration (<0.8 mg/l) causes dental carries, sources of Fluoride are found in coke, glass, and ceramic, electronic, pesticide and fertilizers. Fluoride of all the samples were in range 0.12- 0.45 mg/l.

Chloride:
The Presence of chloride in natural waters can mainly be attributed to dissolution of salt deposits in the form of ions (Cl^-). High chloride content has a deleterious effect on metallic pipes. Chloride was found to be in the range of 116-200 mg/l.

4. Conclusion

In the Present study physico-chemical factors in water at its source and consumers points areas were assessed because contaminated water may lead to the various health related Problems. The present study emphasized on the two major findings. Firstly chlorination is much to reduce the microbial load of water. Secondly Turbidity load at consumer points areas indicates that water become contaminated when it is supplied to these areas. The possible reason of this might be the poor maintenance of water supply system due to which water might be exposed to various toxic material. There is a possibility that these microbes may tolerate level of residual chlorine. when this polluted water is consumed it lead to various water borne diseases viz abdominal problems etc. Therefore, it is necessary that supplied water should be regularly assessed.

Water is with chloride, cl, more than its limits, water can not consumable for normal like and drinking and fluoride may be kept as low as possible. High fluroide may be kept as low as possible, High fluroide may cause flurosis. If the quantity is below 0.6 mg/l. There is possibility of high risk of dental weakness. The value of parameters are compared with standard given by BIS/ WHO.

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