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Original Research Article

SOME TRACE ELEMENTS ASSESSMENT GROUND WATER OF SEHORE DISTRICT IN MADHYA PRADESH

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Abstract: In present study traces element characteristics of ground water samples of in and around Sehore city of M.P., India were studied to evaluate its fitness for public drinking. Water samples were collected from five different collecting points of selected area. These parameters were analyzed and values obtained were compared with standard values recommended by WHO and ISI. Discusses the results obtained in due course of research work done along with the expected consequences. The whole research work is given containing the impact of pollution in human beings with some suggestion by which intrusion of pollutions into water can be prevented and prescribed some simpler indigenous technologies for purification.

Key-Words: Drinking Water, Correlation Analysis, Sehore, Traces Elements.

Introduction: Water is not only the most significant essential ingredient of all animals, plants and other organisms but also key for the survivability of mankind in the biosphere[1-2]. Water is probably the most significant natural resource in the earth, since lacking it life will be non-survival and manufacturing activities cannot take place[3]. It plays a vital role in the growth of communities because; a reliable supply of water is an essential requirement for establishment of a permanent society. Water is the elixir for life. Sufficient supply of drinkable safe water is very essential and is the basic need biota on the globe[4].

Water is polluted more or less at every nook and corner of the World. Water resources in India have no exception for this phenomenon[5], so a water quality monitoring program is necessary for the protection of fresh water resources[6]. Water pollution in India presents a pathetic scenario[7]. In India, groundwater is polluted to varying degrees at different industrial regions as evidenced by recent reports[8]. According to Central Pollution Control Board-India, 90% of water supplied in India to the town and cities are contaminated, out of which only 1.6 % gets treated[9].

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Trace Elements in Groundwater: Pollution of groundwater is an impairment of water quality by chemicals, heat or bacteria to a degree, that does not necessarily create and actual public heath hazards, but does adversely affect such water for domestic, farm, municipal or industrial use[10]. Many trace elements are essential nutrients however certain trace elements such as As, Cd, and Hg are known to be persistent environment contamination and toxic to most form of life. Trace elements are generally present in small concentration in natural water system[11]. Their occurrence in groundwater and surface water can be due to natural sources such as dissolution of naturally occurring minerals containing trace elements in the soil zone or the aquifer material or to human activities such as mining, fuels, smelting of ores and improper disposal of industrial wastes[12].

So, we investigate in present study, trace metal analysis of groundwater of selected site of sehore district of Madhya Pradesh.

Materials and Methods

Choosing Appropriate Sampling Spots: Sampling spots had been selected as the background of the degree of pollution around the Sehore. The locations of sampling spots are given in Table No.1 name was coded from SD1 to SD 5. These were orderly Jattakheda (SD1), Khachrod (SD2), Larkui New (SD3), Nadan (SD4), and Rala (SD5).

Table No. 1: Locations of Sampling Spots & Their Code Name

S. No.	District	Block	Location	Latitude	Longitude	Name Code
1.	Sehore	Sehore	Jattakheda	23.153	76.963	SD1
2.		Ashta	Khachrod	22.872	76.718	SD2
3.		Nasrullaganj	Larkui New	22.817	77.209	SD3
4.		Ichhawar	Nadan	22.897	77.122	SD4
5.		Nasrullaganj	Rala	22.69	77.314	SD5

Method for Sample Collection: Grab water samples were collected at fixed time viz. 1st date of every month between 9:00 am to 4:00 pm in stopper polyethylene bottles of 2L capacity, for physico-chemical analysis while glass bottles were used for heavy metals. Before sampling containers were washed in order of 6N HNO_3, Tap water, DD water and finally with watersamples[13].

Experimental Method: In order to develop a clear perception, water samples were analyzed into three sections viz. Physical, Chemical and Heavy metals. These parameters were determined by performing relevant experiment in sampling spots and in laboratory. Sampling were start from August 2016 to July 2018 and analysis done on three slot i.e. monsoon, pre-monsoon and post-monsoon.

Metal Analysis Using ICP – AES: For measurement of under consideration Heavy metals Fe, Mn, As, Zn and Al (light metal), Inductively Coupled Plasma – Atomic Emission Plasma (ICP-AES) Spectrophotometer method was used. BIS 10500: 2004, Sec-3025 (part-2) describes the procedure to determine the dissolved, particulate and trace metals in raw, potable and waste water with the help of Inductively Coupled Plasma-Atomic Emission Plasma (ICP-AES) Spectrophotometer[14].

Assessment of Statistical Parameters:

Statistical calculation were done using M.S Excel[13] using various standard inbuilt function. Correlation Matrix was prepared with special Data Analysis Tool in Excel.

Results and Discussions

Manganese (Mn): Examination showed 10% observations in investigation year August 2016 to July 2017 and 20.8% observations in analysis year August 2017 to July 2018 were higher than the approved tolerable limit from BIS[15] and WHO.

In the present investigation it was observed that order of Mn concentration in water varies highest in pre-monsoon to lowest in post-monsoon. Geological structure and unscientific water disposal and leaching are the dominant factor for the enrichment of Mn in water[16]. Similar trend were observed in Solai A. et al.[17] in Pondicherry.

Arsenic (As): Assessment year August 2016 to July 2017 showed As concentration found in SD1[0.003 mg/L] and GW of SD5[0.169mg/L] marked high and low values. Assessment year August 2017 to July 2018 illustrated highest value of As were marked in SD7[0.152 mg/L] while lowest in SD4[0.003 mg/L].

Zinc (Zn): Nearly all the samples(100%) showed values below the essential limit as stipulated by standard agencies: BIS12 and WHO. In present analysis showed high and low values of Zn in the assessment year August 2016 to July 2017 were SD5[0.410 mg/L] and SD3[0.046 mg/L] respectively. Furthermore, Zn content were found at SD4 [0.01675 mg/L] in pre-monsoon as high and SD1[0.055 mg/L] in monsoon as low in the investigation year August 2016 to July 2017. Similarly, in the year August 2017 to July 2018, high Zn were obtained in SD8[0.242 mg/L] and low in SD2[0.054 mg/L] while SD8[0.250 mg/L] in pre-monsoon as high and SD1[0.033 mg/L] monsoon as low. Adak M. D. et a1[18]. in Water of Rajgangpur, Nair G. A. [189]et al. in water of N – E Libya and Sabhapandit P. et al.[19] in pond water, river water , tube well and ring well in Assam had found Zn content less than the permissible limit of BIS12 and WHO. These results are inconformity with the result in the present work. The low concentration of zinc in drinking water could be due to the fact that pH of water samples are slightly alkaline and its solubility is a function of decreasing pH.[20] A minor increase of Zn level from pre-monsoon to post-monsoon might be due to agricultural runoff from the surrounding areas evidenced by Tripathi C.P. [21] et al. in water of river Gomti at Lucknow.

Aluminium (Al): In present study, evidenced high concentration of Al was found in SD5 [0.633 mg/L] and low in SD1[0.079 mg/L] for the assessment year August 2016 to July 2017 whereas in SD2[1.833 mg/L] as high and SD4[0.029 mg/L] as low in the monitoring year August 2017 to July 2018. It was observed that high Al content in SD4 [1.22 mg/L] pre-monsoon August 2016 to July 2017, lowest in SD1[0.0425 mg/L] monsoon August 2016 to July 2017, likewise highest in SD4[1.983 mg/L] pre-monsoon August 2017 to July 2018, lowest in SD5 [0.00275 mg/L] monsoon August 2017 to July 2018.

High level of Al was also recorded by Buragohain M.[22] et al. during summer season than winter in Demaji dist. Assam. Parallel observation wasalso recorded by Jens P. N.[23] in water of southern Norway and Tuzen M. and SoylakM.[24] in different water system of Turkey.

Ferrous (Fe): Study showed high concentration of Fe in SD4 [2.464 mg/L] and low in SD1[0.497 mg/L] for the assessment year August 2016 to July 2017. Also, evaluated the maximum concentration of Fe in SD4 [2.532 mg/L] monsoon August 2016 to July 2017, lowest in SD1[0.38 mg/L] monsoon August 2016 to July 2017.

In the same way for the assessment year August 2017 to July 2018, high content of Fe was found in SD4[2.437 mg/L] while low in SD2[0.4085 mg/L]. The high values were estimated in spring and summers while the low in cold seasons. Similar observation is earlier reported by Amaal M. Abdel-Satar[25] in water of Cario. During investigation observed that high concentration of Fe was in surface water while lowest in ground water during summer. The higher concentration of metals observed during summer could be attributed to the industrial and land derived materials along with domestic, municipal, and agricultural wastes, which include residues of heavy metal. The decrease in Fe concentrations during cold seasons mightbe credited to the increase in DO, which leading to oxidation of iron and precipitatesunder alkaline pH.

Conclusion: The results of the present study reveal that the water quality at many places does not meet the required standards as per BIS requirements (IS 10050, 1995). The study

identifies many factors for the degradation in the water quality of the water resources which include: -

a) Breakage of pipelines at several places.
b) Washing of clothes near the pipelines/groundwater sources.
c) Washing of vehicles near broken pipeline/groundwater sources.
d) Open defecation near the pipelines/groundwater sources.
e) Cattle wallowing near pipelines/groundwater sources.
f) Disposal of solid waste near the pipeline/groundwater sources.
g) Flow of sewage in open drains.
h) Proximity of sewerage pipelines with drinking water pipeline/groundwater sources.
i) Leaching of inorganic minerals from soil/rocks.

Recommendations: The present study clearly indicates the health implications related to the potable water being used in the city of Bhopal. The city of Bhopal like most of the other larger cities in the country is facing the challenge of supplying safe and wholesome water to its residents. With the ever expanding city limits the challenge of water supply is increasing. However, some small measures can help in a long way to maintain safe and wholesome water supply to the residents of the city. Some of the recommendations for maintain safe water supply from surface as well as groundwater sources in Bhopal city are as follows:

a. Registration and regulated use of groundwater.
b. Periodical monitoring of water quality of water sources.
c. Maintenance of hygienic condition around groundwater sources.
d. Construction of cement platforms surrounding the groundwater abstraction sources.
e. Frequent chlorination of public groundwater sources.
f. Artificial recharge to augment the groundwater recharge.
g. Adoption of specific treatment process in case of absence of alternate.
h. Disinfection of groundwater Setup of decentralized treatment plants.
i. Laying of underground sewage system.
j. Scientific management and disposal of solid waste.
k. Avoid leakages in the pipelines of municipal water supply.
l. Regular public awareness campaigns to sensitize public.

Thus, a holistic approach of environmental management including all vital components like air, water and land shall go a long way in improving the overall health of environment in the city in general and potable water sources in particular.

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