



ISSN: 2319-5967

ISO 9001:2008 Certified

International Journal of Engineering Science and Innovative Technology (IJESIT)

Volume 4, Issue 4, July 2015

Effect of open waste dumping on its surrounding surface water bodies in Bhanpur Bhopal (M.P)

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Abstract- In the present study the impact of solid waste disposals on water bodies and its effects on human health was studied. The effects of open waste dump site on the surrounding water bodies and its quality in Bhanpur Bhopal, Madhya Pradesh was investigated. Water samples were collected from many sample stations (hand pumps, tube wells, taps etc.) in and around Bhanpur Bhopal. As per the results of the studied parameters like pH, calcium, turbidity, TDS, Nitrate, Chloride, Iron, Magnesium, Sulphide, Coli form, it was seen that the dump site impacted its surface water heavily. The effect of all these parameters was studied and it was clearly revealed that all the parameters have harmful effects on the water bodies and health as well. It was seen that the toxic effects are caused by the pollutants such as heavy metals, organic and inorganic compounds, cyanides, biocides, insecticides; pesticides etc. which have very low permissible limits in waters and their presence beyond these limits can render the waste unfit for aquatic life as well as human purposes. Many of these toxic chemicals accumulate in the body of organisms causing long term effects.

Key Words: Waste dumping, organic & Inorganic compounds, Pollutants, Toxic chemicals.

I. INTRODUCTION

Bhopal, the capital city of Madhya Pradesh is witnessing rapid urban development and industrialization¹. There are 18 water bodies of diverse sizes located in and around the city. The city was developed over a period of over 900 years and is facing the problem of decline of water bodies. It has been seen that the solid wastes disposed in these water bodies is declining them on large extent. As the municipal solid wastes are disposed in the landfill site of Bhanpur Bhopal without any scientific treatment all the water bodies of Bhanpur side gets polluted with toxic materials. The contamination occurs through leakage, which is formed when rain water infiltrates the landfill and dissolves the solute fraction of the waste and the soluble product formed as a result of the chemical and biochemical processes occurring within the decaying wastes². As, a result a large number of pollutants make water anesthetic and unfit for use by adding color, taste, odor to the water bodies. Besides many chemical reactions occur which result in the formation of unwanted products by the changes in oxygen, temperature and pH. Municipal solid wastes have been proved to be extremely toxic and infectious. Due to the uncontrolled and unscientific dumping of such wastes in the disposal site of Bhanpur Bhopal the contamination of ground water and surface water has been observed³. Besides this the indiscriminate dumping of municipal solid waste and the direct disposal of sewage lines in the lakes has made the water polluted to the large extent both for human and aquatic purposes. The dumping of municipal solid wastes in water bodies and low lying areas is a common practice followed by municipalities with no consideration of its effect on environment⁴.

Study Area: The study area selected was the urban area of the city of lakes, Bhopal Madhya Pradesh, India. Water samples were drawn from the hand pumps and bore wells during monsoon seasons of 2014. The study area of Bhanpur Bhopal has 75 acres of land for waste disposal. The waste generated in the city is deposited at the land fill site. It is situated in Bhanpur Bhopal village at a distance of 16km from the city. No scientific method of waste disposal is adopted. All the waste is disposed off at the landfill site adopting of crude dumping of waste. The main water bodies studied were:

S.No	Study Area	Source
1	Upper Lake Bhopal	Lake water (L ₁)
2	Lower Lake Bhopal	Lake water (L ₂)
3	Patra River	River water (R ₁)
4	Damkheda	Tube well (T ₁)



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5	Mohali	Tube well (T ₂), Hand pump(H ₁)
6	Bhanpur right side under bridge	Hand pump (H ₂), Tube well (T ₃)
7	Satya Narayan Swami	Tap water (TW ₁)
8	Water supply near Indian oil	Hand pump (H ₃)
9	Patel Nagar main road	Hand pump (H ₄)
10	Bhanpur Chola Road	Tube well (T ₄)

II. METHODOLOGY

For the analytical results obtained to have any validity and meaning it is essential that the adequate sampling procedure be adopted. Sampling is the process of extracting from a large quantity of material a small portion which is truly representation of the composition of the whole material. Various methods were adopted for different parameters. For determining turbidity Nephelometre (turbidity meter) was used. The pH values of water samples were obtained by Electrometric method. Alkalinity of the water samples was observed by taking various indicators and a standard acid solution. The estimation of chloride was carried out by Mohr's method. For the estimation of Nitrates samples were evaporated to dryness on hot water bath and phenol disulphonic acid solution was added to the residue. The reading was taken on UV spectrophotometer. The hardness of the water samples was studied by EDTA method. Sulphate was estimated by Turbid metric method. Bacteriological characteristics were determined by using nutrient agar which was used to determine heterotrophic bacterial count. All plates were incubated 35⁰ c for 24hrs. Metals like Iron were carried out by Atomic Absorption spectrophotometer⁵.

III. RESULTS AND DISCUSSION

Sample Stations with studied Parameters & Values

	L1	L2	R1	T1	T2	H1	H2	T3	TW1	H3	H4	T4
Ph	7.89	7.10	7.7	7.6	7.5	7.6	7.6	7.5	7.4	7.9	7.3	7.5
Chloride	25.3	80.6	165	263	190	350	171	274	180	250	190	150
Total hardness	132.0	76.5	775	654	530	680	570	460	350	620	560	570
Nitrate	3.5	1.9	11.6	17.6	20.6	13.2	28.6	29.0	7.0	33.0	15.8	27.5
Magnesium	98	61	84	91	53	48	32	28	46	55	44	75
Calcium	83.7	118	132	136	128	132	170	164	135	120	130	110
Fluoride	1.3	1.9	0.28	0.21	0.38	0.21	0.22	0.27	0.26	0.27	0.26	0.3
Iron	1.5	1.0	0.50	0.26	0.11	0.24	0.15	0.3	0.2	0.15	0.32	0.09
Sulphate	128	142	27.6	41.5	25.4	31.9	12.6	63	24.0	54.0	28.4	65.5
TDS	130	171	565	860	720	690	716	648	594	650	680	645
Turbidity	18.3	11.9	2.4	2.6	3	3.6	2.8	2.5	2.7	3.1	4.5	3.8

- The pH values of water samples were almost permissible as per WHO and BIS values, but were found to be alkaline in the water samples of L1 and L2.
- In the water samples of T1, H1,H2, T3, TW1, H3,and H4 the chloride was found to be greater than highest desirable limits of WHO⁶ and BIS.
- The Nitrate content was found to be highest in the water sample of H1.
- The hardness was found to be higher in the water samples of T2, H1, H2, T4, H3, H4, R1.
- Some the water samples of Bhanpur region were found to contain the parameters like Magnesium, Calcium, Fluoride, Iron, Sulphate and TDS above than the highest desirable limits of WHO⁷ and BIS⁸.
- Turbidity was found to be almost normal in the water samples of Bhopal however it was slightly found to be higher in water samples of Bhanpur area.



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- Almost all the studies samples of ground water, all the samples showed the surplus growth of Fecal colonies which indicates the contamination of water with fecal waste that may contain harmful diseases causings organisms which includes Bacteria, viruses or parasites such as Guardia, the cause of severe fever.
- The organic components of solid wastes provide food and shelter to disease carrying rodents and insects. Domestic wastes contain human excreta, bio-medical waste and many other toxic and hazardous wastes too. Therefore if not managed properly can cause and spread several diseases.

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