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Impact Of Municipal Solid Waste Dump Site On The Ground Water Quality At Amravati, M.H.

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ABSTRACT: Groundwater is a precious natural water resource considered as a readily available and safe source of water for domestic, agriculture and industrial uses. In India, groundwater is being polluted due to various human activities. Improper solid waste management is one of the major sources of environmental pollution deteriorating groundwater quality around landfill sites. In this view, present study was carried out to assess the impact of existing landfill site on groundwater quality at Amravati. In order to achieve this, 20 well water samples around landfill site at different distance were analyzed. Parameters analyzed are pH, EC, TDS, BOD, COD, total hardness, phosphate, nitrate, copper, lead and coliform population. Results revealed that concentration of all the parameters except for pH, are higher than acceptable limits for safe drinking water. The distance from the landfill site also influences on groundwater quality. Overall, the groundwater is highly polluted due to existing landfill site in this study area. Therefore, the relevant authority should take immediate measures to rescue this area.

KEYWORDS: Groundwater, Leachates, Municipal Solid Waste, Water Quality

I. INTRODUCTION

Of all the natural resources, water is unarguably the most essential and precious. Life began in water, and life is nurtured with water. There are organisms, such as anaerobes, which can survive without oxygen. But no organism can survive for any length of time without water. The crucial role of water as the trigger and sustainer of civilizations has been witnessed throughout the human history, no life without water is a common saying (Abbasi *et al.*, 1996). Water is the most abundant and essential compound in all the living systems. Water has played a crucial role in the process of chemical evolution by facilitating the formation of living molecules from simple molecular arrangements. It is a universal solvent, and as a solvent it provides the ionic balance and nutrients, which support all forms of life (Shastri, 2000). The ground water originates as infiltrations from precipitations, stream flows, lakes and reservoirs. The quality of water therefore depends on the type of materials on the passage routes, the dissolved salts and general human activities especially those bordering on waste disposal systems. Ray (1988) has reported that, where the water table is shallow and the soil is porous, dissolved gases, nitrates, sulfates, soluble organic compounds and dissolved salts might be introduced into the groundwater system. Thus, if the solid waste disposal sites are not chosen wisely, high concentrations of chemical and gaseous compounds or decayed organic matter may leach through the soil and contaminate ground waste.

This garbage dumping has been carried out continuously several years in this region without any sort of proper management. Moreover, not only the garbage but fecal deposition also takes place in that region. Hence, there is high risk of groundwater contamination. Since people residing near this dump-site use the ground water for their drinking and agriculture purposes, it is essential to study the impact of this open dumping on groundwater quality that would be valuable data to undertake proper management decision in future. This study therefore aimed to assess the impact of municipal solid waste dumpsite on well water quality in the vicinity of Amravati Maharashtra.

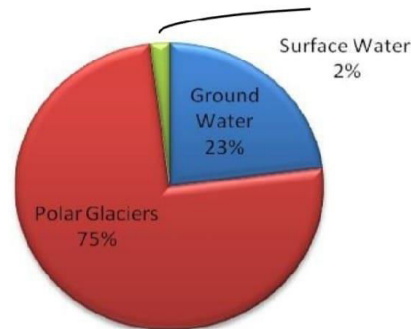


Fig. 1.1: Distribution of fresh water in nature (CPCB,1991)

II. RELATED WORK

AIM : TO STUDY THE SEASONAL CHANGES IN THE QUALITY OF GROUND WATER AT THE VARIOUS SELECTED STATIONS.

OBJECTIVES:

The present study has been carried out with the following objectives:

1. To study the physico-chemical characteristics of ground water in and around the MSW dump site at Amravati, Maharashtra..
2. To assess the potability of ground water in six selected stations by comparing the results of the present study with standards specified by BIS (2012).
3. To assess whether there is any contamination of ground water by the MSW dumpsite.
4. To recommend measures to abate contamination of ground water by the MSW dumpsite.

III.METHODOLOGY

Site selection and Sampling

Water samples were collected from the dug wells and bore wells, around the dumping site. The sampling stations were at a minimum of 500 meters distance from each other. The area selected was of about 2 Kms radius from the dumping ground at Nandgaon Kkandeshwar. The sampling stations were divided in core zone (approximately 1km.) and buffer zone (area after the core zone). The water samples were collected in the sterile polythene bottles of 1 liter capacity between 8.00 am to 11.00 am. During sampling all the precautions were taken as per the standard guidelines to avoid any possible contamination. In case of dugwells, the water samples were collected by lowering the bottle at depth of about 1 foot below the surface and then opening the cap to collect the water. For borewells, the tap was fully opened and allowed to run to waste for about 5 minutes and then the water sample was collected in the sterile sampling bottles. discussed in this chapter for MSW, ground water and soil samples.





Ground Water Sampling

The objective of ground water quality sample collection is to obtain a small portion of material that accurately represents the characteristics of the water body being sampled. This is referred to as taking a ‘representative sample’ and is vitally important because the conclusions that are ultimately drawn from the data obtained as per guidelines and methods of sampling of ground water.

Soil sampling

The objective of soil sampling is to obtain a small portion of the sample that accurately represents the characteristics of the particular location being sampled. Less quantity of soil sample is actually used for the laboratory analysis. That small amount of sample must represent the entire area for which the recommendation to be made. This is referred to as taking a ‘representative sample’ and is vitally important because the conclusions derived that are ultimately drawn from the data obtained from the analysis. For authentic report, representative soil sample is essential for soil testing to find out the contamination and its estimation. Therefore to take accurate soil sample, a proper methodology with clear objective, time, depth and tools were followed.

IV EXPERIMENTAL RESULTS

The present study on the “Impact of Municipal Solid Waste Dumpsite on the ground water quality near Nandgaon Khandeshwar at Amravati, MH., India” has been carried out at Amravati from 1st week to 4th week. (Nandgaon Khandeshwar was the landfill site with an area of 100 acres and in operation since 2004 in Amravati. Though there is no scarcity of ground water, the ground water quality has been deteriorating with excess of TDS, Total Hardness, Chlorides etc., affecting the potability of water. The present study was taken up to assess the impact of MSW dumpsite on the quality of ground water at 3 stations viz. (i) Akoli Road, Amravati (Latitude-77.735308, Longitude-20.905194) (ii) Area located near Kathora Road, Amravati (Latitude-77.754977, Longitude-20.976646) (iii) Chatri Talav, Amravati (Latitude-77.774469, Longitude-20.905103). The selected stations were located at a distance ranging from 1 km to 20 km from the MSW dump site.

PART I A description of each water quality parameter in the 3 stations during the study period presented here

Station I: Chlorides (mg/L) in ground water at the outskirts of Akoli.

Sampling Month	1St Week	2nd Week	3rd Week	4week
March	198	192	231	206
May	206	198	192	189
July	201	187	176	193
September	191	154	169	178
November	169	162	158	175
Januray	187	181	184	193
MEAN±SD	192±13.175	179±17.389	185±25.424	189±11.296

Station II: Nitrate Nitrogen (as NO3-N) (mg/L) in ground water at the residential area of Nitrate nitrogen concentrations in ground water at the residential area of Kathora

Sampling Month	1st week	2nd week	3rd week	4th week
March	27.91	27.9	28.4	28.2
May	27.64	26.9	27.9	27.7
July	26.8	26.88	27.8	27.1
September	26.5	25.72	27.6	26.8
November	22.58	25.8	25.6	27.1
January	27.82	27.6	27.1	26.9
MEAN±SD	26.5±2.022	26.8±0.898	27.4±0.977	27.3±0.540



Station III: Sulphates (mg/L) in the ground water at Chatri Talav

Sampling Month	1st week	2rd week	3th week	4th week
March	26.4	24.9	25.8	25.6
May	25.6	24.1	25.2	25.8
July	25.6	23.6	24.6	24.9
September	23.7	22.7	22.4	23.3
November	18.1	17.9	21.4	17.0
January	25.8	24.2	23.4	23.8
MEAN±SD	6.86±0.158	6.92±0.126	7.1±0.16	7.16±0.149

V.CONCLUSION

The investigation of groundwater around MSW dumpsite of Amravati reveals that 100% of samples during post-monsoon were unfit for drinking and other domestic purposes on the basis of TDS and other parameters. During post-monsoon period all physical and chemical parameters of all ground water samples were abnormally increased which could be due to the leaching of MSW from the open landfills. This indicates that domestic waste leads to more critical problem to the peoples who are living nearby the dumpsite and suggests lack of sufficient sanitary facilities due to uncontrolled urbanization. Pb, Mn and Cr were found to be high in all samples. The findings clearly indicate that the ground water and soil of the study area is heavily polluted especially with toxic heavy metals besides high TDS and other inorganic major constituents. The findings of the study also indicate that there is a need for proper industrial planning and the safe disposal of industrial and urban waste which would otherwise lead to severe environmental degradation

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