EVALUATION OF GROUND WATER POLLUTION DUE TO LANDFILL LEACHATE

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Abstract— Water is precious resource which is over exploited due to increase in population, urbanization and industrialization. In the recent past, it is observed that ground water is also polluted due to disposal of municipal solid waste.

In the present study, an attempt is made to study the extent of ground water pollution in and around a landfill site located in Nagole,Medchal dist.

Samples are collected from wells, 2 kms around the municipal solid waste dumping site the physio- chemical analysis like calcium, magnesium, potassium, iron, Ph, nitrate, acidity etc. are analyzed

Away from the landfill site at a radius of 2.0 km the pollution of ground water is observed to be reduced.

Index Terms— Ground water Quality index, water Quality Index, Calculation of ground water quality Index.

I. INTRODUCTION

Solid wastes are being produced since the beginning of civilization. With the advent of industrialization and urbanization, the problems of waste disposal increased. Environmental impact due to gaseous and liquid discharges has received greater attention than the received by solid waste through it's significant. The term"waste"implies that it is of no concern to anyone and is of no value. Solid waste management is a complicated process that not only requires the proper selection and application of approaches for the storage, collection but also transport, transfer, processing and final disposal of' the material**.**

II .MATERIALS

. Water sample is collected from the Nagole, Medchal dist Hyderabad. It is then tested for its various engineering and index properties. The results are shown in the following table1.

III. METHODOLOGY

The wells near the dumping site in a distance of 2km radius were identified.

Ground water samples were collected from some wells.

The water samples were analyzed for the parameters like calcium, Magnesium, Potassium, Sodium, Ph, Nitrate, Total hardness, Alkalinity, Total dissolved oxygen and BOD

IV. UNITS

The results of physio-chemical parameter of ground water at various points are given. The results indicate the quality of water varies considerably from location to location.

The values of almost all parameters are above the permissible limits. The wide variation is due to dissolved materials from leachate.

Ph values are found to vary from 7.4-9.42. All the values are within the drinking standards. Though Ph has no effect on human health, all bio-chemical reactions are sensitive to the variation of Ph. For most reaction and as well as for human begins, Ph value of 7 is most ideal. The limit of Ph value for drinking is specified as 6.5-8.5.

Total alkalinity of water is mainly due to presences of

Bicarbonate contents in water. This is also associated with calcium and magnesium contents in the water. The alkalinity of samples is very high and varies between 240-500 ppm. The maximum permissible limit is 250ppm.

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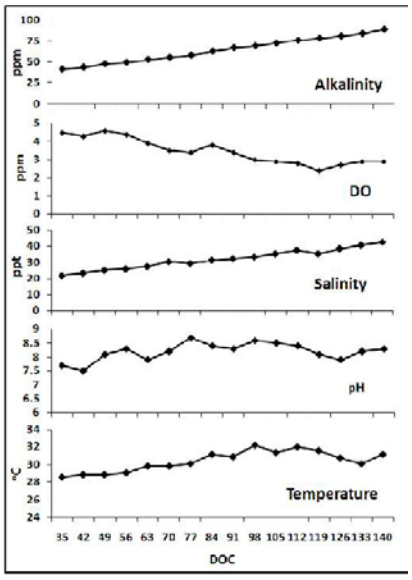
Figures and Tablets

S.No	Test Parameters	Units	Results	Acceptable limits (As per Is :10500;2012)
1	Calcium	Mg/l	48	75
2	Magnesium as Mg	Mg/l	26.7	30
3	Sodium as Na	Mg/l	140	20
4	Potassium as K	Mg/l	16	10
5	Ph	Mg/l	7.96	6.5-8.5
6	Nitrate	Mg/l	2	45
7	Total Hardness	Mg/l	238.5	200
8	Alkalinity	Mg/l	40	200
9	TDS	Mg/l	776	500
10	Chlorides	Mg/l	268	250
11	BOD	Mg/l	4	1
12	DO	Mg/l	7.2	5



V. METHODOLOGY:

The GWQI was calculated using weighted arithmetic index method and the quality rating I sub index (Qi) corresponding to the I parameter pi is a number reflecting the relative value of this parameter. the Qi is calculated by using the following expression.

Qi = ((Mi-Ii) / (Si-Ii)) *100

Unit weight of the parameter Wi=K/Si

K = 1

(1/S1) +(1+S2) +(1/S3) +……+(1/Si)

S1,S2,S3,S4,……Si are standard values of various parameters from 123…..i.

Mi=Estimated values of the I parameter in the laboratory.

Ii= ideal values of the I parameter

Ii= 0 for the all parameter except for DO and Ph which are 14.6 and 7.0

The overall GWQI was calculated by aggreagating the quality rating (Qi) with weight (Wi) linearly.

$$GWQI = \{ \sum_{i=1}^{n} (QiWi) / \sum_{i=1}^{n} (Wi) \}$$

Estimation of Ground Water Quality Index

Bore Well No.	∑Wi	∑Qi Wi	GWQI	Water Quality Rating
1	0.9958	282.12	282.356	Unfit
2	0.9958	724.23	725.960	Unfit
3	0.9958	355.52	357.320	Unfit
4	0.9958	83.98	85.240	Very Poor
5	0.9958	277.24	278.960	Unfit

In this study, The GWQI for purpose is considered and permissible GWQI for drinking water as 100, i.e., any value above indicates ground water contamination.

WQI Level	Water Quality Rating
0-25	Excellent
26-50	Good
51-75	Poor
75-100	Very poor
>100	Unfit for drinking purpose

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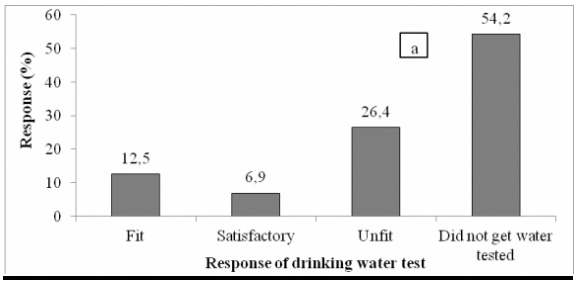

Scope for future:

The ground water quality can be assessed seasonally.

The characteristics of the leachate should be studied.

Statistical analysis can be carried and regression equation among the variables can be established.

GIS can be used to identify the landfill site.

The waste characterization should be made, soil and geological characteristics to be studied, which may give a better idea of ground water pollution.

References

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CONCLUSIONS

1) The Ground Water Quality was determined using weighted Arithmetic Mean method.
2) The Ground Water Quality index in the entire area is above 100 indicating that the water is unfit for drinking except one sample.
3) Thus, the results indicate that ground water is polluted near the land fill site and is unfit for drinking.
4) The Water in the entire area is very hard and requires treatment.
5) The presence of BOD in ground water was observed.

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