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Assessment of Ground Water Quality of Rajasthan with Special Reference To Balotra (Barmer) Region

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Abstract - The present study was carried out with the objective of determining the extent of groundwater pollution caused by industrial activity in Balotra, Barmer district Rajasthan which is located at the bank of Luni river. Groundwater Samples were collected from twenty different places, nearby area of Luni River and analysed for the physicochemical parameter and all results were compared with Indian standard specification for Ground water. In the present study twenty water samples are collected from different sites and analytical result are compare with BIS Specification and our results are clearly shows that the ground water is highly contaminated due to industrial activity.in many physicochemical parameter are behind the permissible limit. Contamination of groundwater causes water scarcity for domestic purpose of this study is to highlight the impact of industrial activity on groundwater.

Key words - Ground water quality, Physico-chemical parameters, Balotra (Barmer) region.

I. INTRODUCTION

"Water is life's matter and matrix, mother and medium. There is no life without water." In now days, the modern civilization, urbanization and expanded population with resulting industrial operation has intensified the old problem of polluting our life, mother and medium. At present our life, mother and medium is being polluted and even worse situation is that we encounter with scarcity of this degraded quality of water too. It has raised certain basic challenges in our environment and we are suffering both the problems of quality and quantity of water[1]. In India groundwater is the major source of drinking water and over 94% of the drinking water demand is met by groundwater. Water quality is essential parameter to be studied when the overall focus is sustainable development keeping mankind at focal point, since it is directly linked with human welfare.

In recent years, the growth of industry, technology, population and water use have increased the stress upon both; our land and water resources. The protection and Enhancement of the quality of ground water and resources is a high priority environmental concern[1]. Deterioration of ground water quality may be virtually irreversible and treatment of contaminated ground water can be expensive. Many contaminants are colorless, test less and odorless. Anthropogenic sources of ground water contamination can be classified in a general way as either point source (localized or individual sources) or non-point sources (activities or processes that introduce contaminants to the ground water aerially and that can consist of multiple point sources)[2]. The wide range of contamination sources is one of the main factors contributing to the need of ground water quality assessment. Chemical contaminants namely fluoride, arsenic and selenium pose a very serious health hazard in this country, it is estimated that about 70 million people are at risk due to excess fluoride. Apart from this, increase in concentration, TDS and nitrate in groundwater is of great concern for a sustainable drinking water[3].

The pollutants infiltrations from various resources (river, landfill sites, drains, agriculture effluents and municipal sewerage) are making portable water deteriorate[4]. Dumping sites are expected locations for contamination production and infiltration, more over it need to assess the impacts on our ecosystem and general public [5]. Urban pollutants origins are different from rural areas and contains high level of toxic chemicals which come from sewage, dumping sites, industries and cultivation activities [6]. Generally, Polar and non-polar complex chemicals compounds are infiltrating from landfill leachate, which contains thousands of types of elements [7]. While Organic, inorganic, heavy metals and toxic chemicals concentration level has been continuously increasing in various areas of world [8]. Urban contaminated soil is affecting number of ways directly and indirectly to human health [9]**I. EXPERIMENTAL**

Sampling methods

Twenty water samples are collected from different areas of Balotra (Barmer) region. These water sources are extensively used for drinking and other domestic purpose. The samples were collected in high grade plastic bottles of two liter capacity after rinsing with distilled water[10].

Analysis method

The physico-chemical characteristics of the ground water samples were determined
by standard methods .The pH and electrical conductivity were measured by using portable meters. The concentration of magnesium, calcium, hardness, nitrate and salinity were estimated by volumetric methods and the results are compared with BIS standards.

S.No.	Parameters	Unit	Method Employed
1.	pH		Digital pH-meter
2.	Electrical Conductivity	mhos/cm	Digital Conductivity-meter
3.	Total Alkalinity	Mg/L	Titrimetric method (With HCl)
4.	Total Hardness (as CaCO3)	Mg/L	Titrimetric method (with EDTA)
5.	Calcium Hardness (as CaCO3)	Mg/L	Titrimetric method
6.	Magnesium Hardness (as CaCO3)	Mg/L	Titrimetric method
7.	Chloride (as Cl-)	Mg/L	Titrimetric method (With AgNO3)
8.	Nitrate (as NO3 -)	Mg/L	Spectrophotometric method
9.	Fluoride (as F-)	Mg/L	Ion Selective Electrode
10.	Total Dissolved Solids	Mg/L	Digital Conductivity-meter

Location of sampling station

Balotra (Barmer)

The samples were collected from Twenty different places; namely, Jasol (Balotra) (Blt_1), asada (Balotra) (Blt_2), bithooja (Balotra) (Blt_3), asotra (Balotra) (Blt_4), manjiwala (Balotra) (Blt_5) Kitnod (Balotra) (Blt_6) parloo (Balotra) (Blt_7), budiwara (Balotra) (Blt_8), pachapadra (Balotra) (Blt_9), Kanana (Balotra) (Blt_{10}). Bagundi (Balotra) (Blt11), gugari (Balotra) (Blt_{12}), dudhwa (Balotra) (Blt_{13}), gopari (Balotra) (Blt_{14}), newai (Balotra) (Blt_{15}), bhilon ki dhani (Balotra) (Blt_{16}), mungra (Balotra) (Blt_{17}), bithuja (Balotra) ($Blt1_8$), bithuja (Balotra) (Blt_{19}), kanana (Balotra) (Blt_{20}).

III. RESULTS AND DISCUSSION

The aim of the study is water quality evaluation for domestic purpose. The results obtained from analysis of water sample from different places of Balotra (Barmer) region are given in Table 2. A Comparison of due physico-chemical characteristics of ground water samples has been made with drinking water standards.

Table 1: BIS standards of permissible and excessive limits of various parameters

Parameters	Permissible limit	Excessive limit
pH	6.5	8.5
TDS	500	2000
Chloride	250	1000
TA	200	600
TH	300	600
Fluoride	0.9	1.5
Nitrate	**45**	**100**

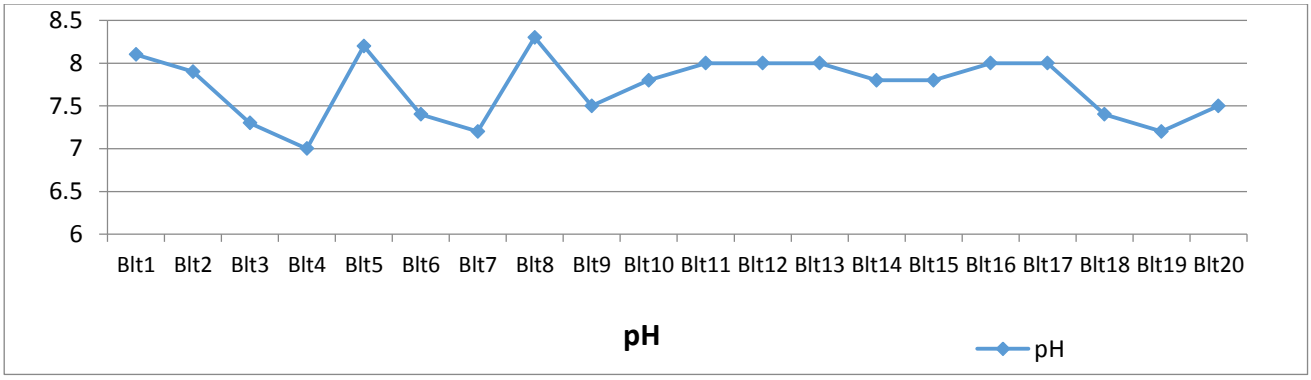
Table 2: Groundwater quality in relation to physico-chemical parameters at Balotra (Barmer) region.

S.N.	Location	Source	pH	EC	TDS	Alkalinity	TH	CaH	MgH	$_{F}$-	Cl^-	NO_3^-
1.	Blt1	*	8.1	7344	4800	310	610	260	350	0.8	1000	23
2.	Blt2	*	7.9	3648	2400	180	480	190	290	0.2	920	57.0
3.	Blt3	*	7.3	13860	9000	240	2830	850	1980	0.7	4010	44.0
4.	Blt4	*	7.0	13464	8000	266	3030	1370	1660	0.5	4400	66.0
5.	Blt5	**	8.2	5355	3500	140	890	280	610	0.5	1520	28.5
6	Blt6	*	7.4	7497	4900	220	1720	690	1030	0.5	2000	27.0
7.	Blt7	**	7.2	1180	771	740	290	140	190	0.5	190	80.0
8.	Blt8	**	8.3	3140	2052	680	410	130	280	0.3	388	41.0
9.	Blt9	*	7.5	4210	2751	242	380	170	210	0.2	695	52.0
10.	Blt10	**	7.8	4680	3058	420	390	240	150	0.2	158	51.0
11.	Blt11	*	8.0	7803	5100	100	1200	480	720	0.8	2080	47.0
12.	Blt12	**	8.0	8020	5200	120	1220	460	760	0.7	2060	51.0
13.	Blt13	*	8.0	7448	4900	90	1090	440	650	0.8	2100	49.0
14.	Blt14	**	7.8	7960	5200	120	1280	490	790	0.9	2080	54.0
15.	Blt15	*	7.8	7925	5180	110	1100	440	660	0.8	2000	47.0
16.	Blt16	***	8.0	9856	6400	290	920	350	570	0.9	2520	59.0
17.	Blt17	**	8.0	8568	5600	320	1020	380	640	0.9	2580	67.0
18.	Blt18	****	7.4	11552	7600	560	690	280	410	2.0	3320	40.0
19.	Blt19	**	7.2	11400	7500	410	710	290	420	1.9	3240	7.0
20.	Blt20	****	7.5	2240	1500	300	320	130	190	1.4	540	8.0

Here, *-CWR (Clean water reservoir), **-GLR (Ground level reservoir), *** -OWR (Open well reservoir,***-Tanka,;****-T/W(Tube Well);All parameters are in mg/L. Except pH and EC (mhos/cm); CaH and MgH-Calcium and Magnesium hardness, respectively

pH

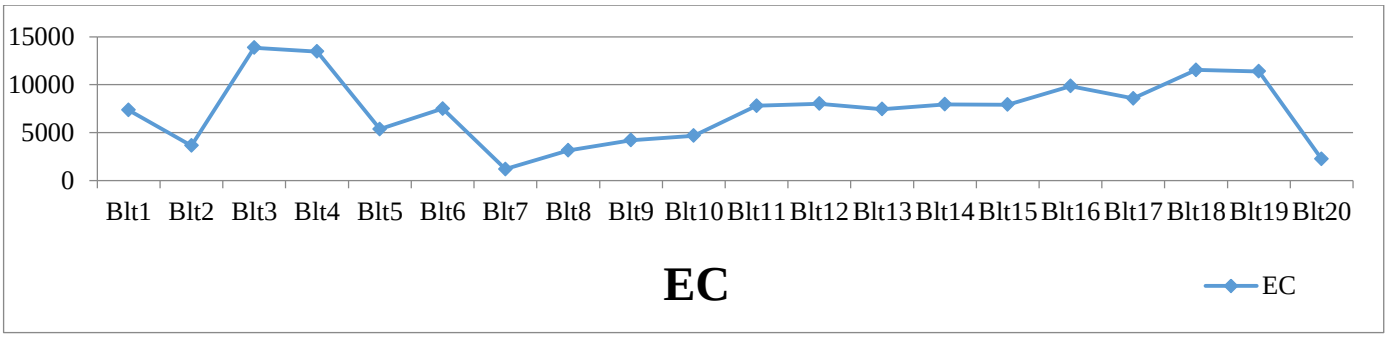
The pH values of groundwater varied from (7.0-8.3) Balotra (Barmer) region. It indicates slightly alkaline nature of water sample of Balotra Barmer (regions). Samples have more salinity. The ground water samples are within the permissible limits.



Electrical conductance (EC)

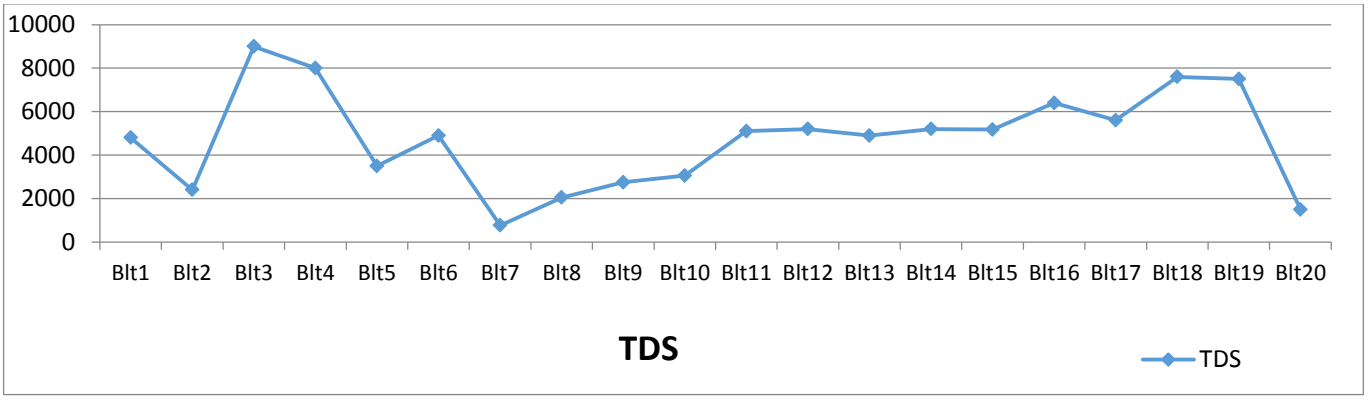
It is well known that electrical conductance is a good measure of dissolved solids and excessive presence of sodium in water in not only unsafe for irrigation but also makes the soil uncultivable. In present investigation, the electrical conductivity of water samples varies from 1180-13860 mhos/cm. The U.S salinity laboratory classified ground water on the basis of electrical conductivity is up to 250 mhos/cm as excellent; 250-750 as good; 750-2250 as fair and > 2250 µ mhos/cm as poor. Based on

this classification, the two water samples belong to fair category and rest of the samples are poor.



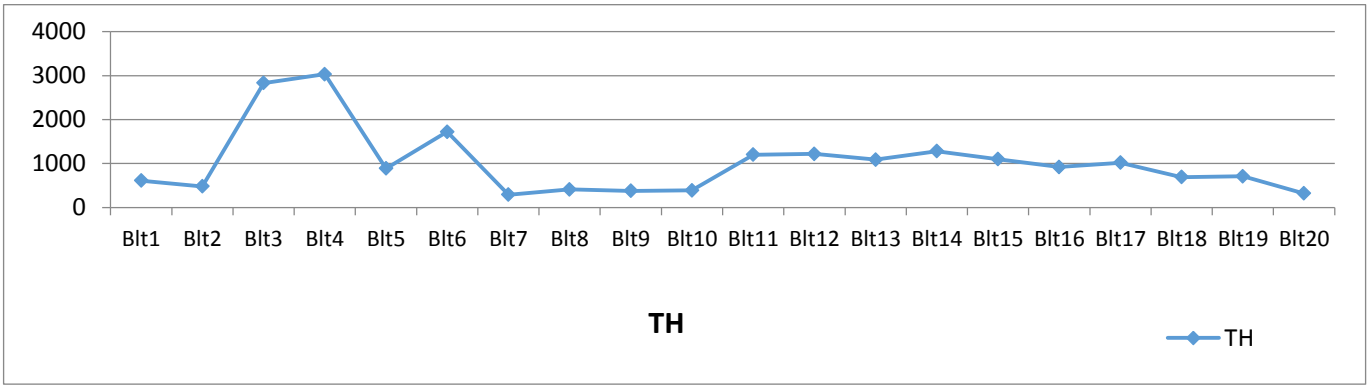
Total dissolved solids (TDS)

TDS indicate the nature of water quality for salinity .The water samples in the study area fall in the range of 771-9000 mg/L According to WHO specification, TDS up to 500 mg/L is highest desirable and up to 1000 mg/L is under maximum permissible category. Thus, based on the concentration of TDS, ground water can be classified as follows : up to 500 mg/L as desirable for drinking, up to 1000 mg/L as permissible for drinking and up to 3000 mg/L as useful for irrigation. One sample is useful for drinking purpose only and remaining samples are not fit for drinking.



Total hardness (TH)

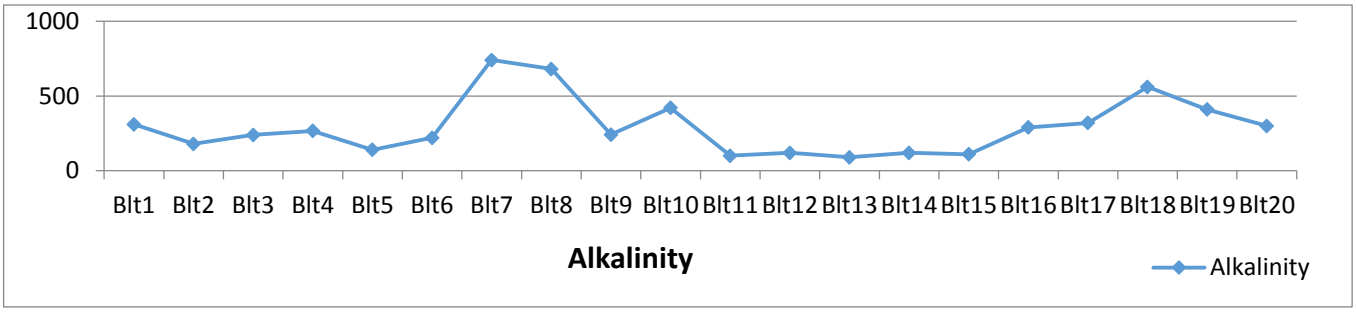
In the present study, the hardness of water samples ranged from 290 to 3030 mg/L. The water samples of the study area are classified according to hardness (BIS), which revealed the 75 % of samples belong to out of permissible limit and 25 % are in permissible limit.



Total alkalinity (TA)

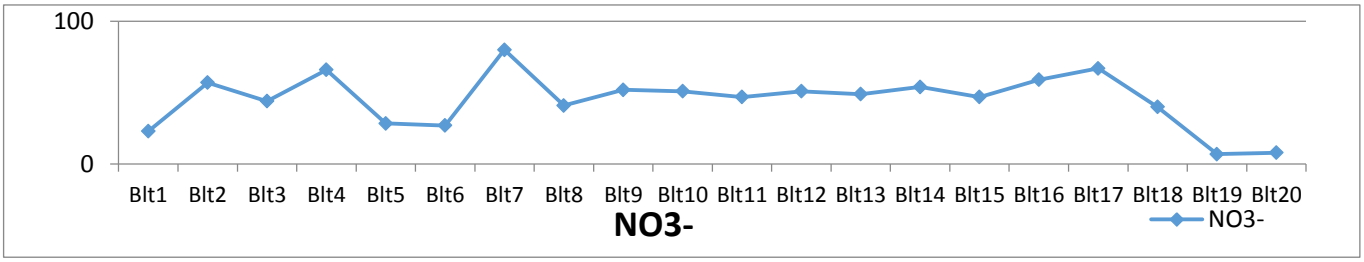
The ground water contains sustained amounts of dissolved carbon dioxide, bicarbonates and hydroxides. These are main sources of alkalinity, which can be conveniently evaluated by acid titration. In the present study, alkalinity ranges between 90-740 mg/L.

According to BIS classification, 80 % of samples are in optimum permissible limit and 20 % are out of permissible limit.



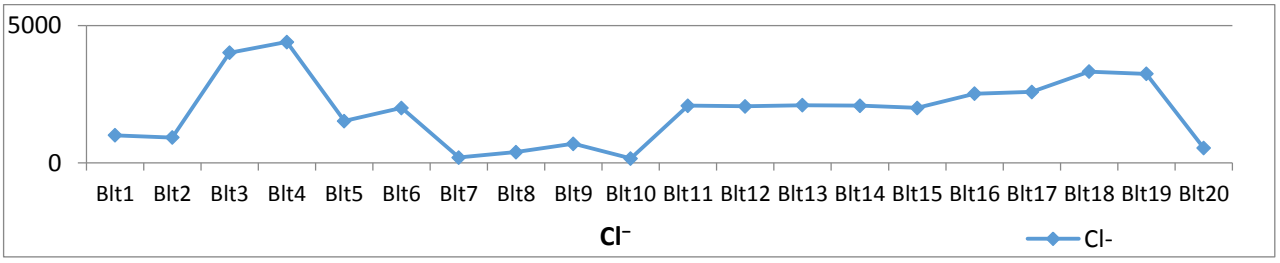
Nitrate (NO_3^-)

According to BIS, the permissible limit for nitrate in drinking water is 45 mg/L. The concentration of nitrate in the water samples varies from 7.0 to 80.0 mg/L .The determination of nitrate is important particularly in drinking water as it has adverse effects on health above 50 mg/L When water with high nitrogen concentration is used for drinking, it causes a disease called methaemoglobinaemia (blue baby disease), which generally affects bottle fed infants. Repeated heavy doses of nitrates on ingestion are likely to cause effects. Nitrate is basically nontoxic but when ingested with food or water, it is reduced to nitrate and then to ammonia, which are toxic. In the present study, out of 20 samples collected, 60 % sample have excessive limit and less 40 %, are well within the permissible limit.



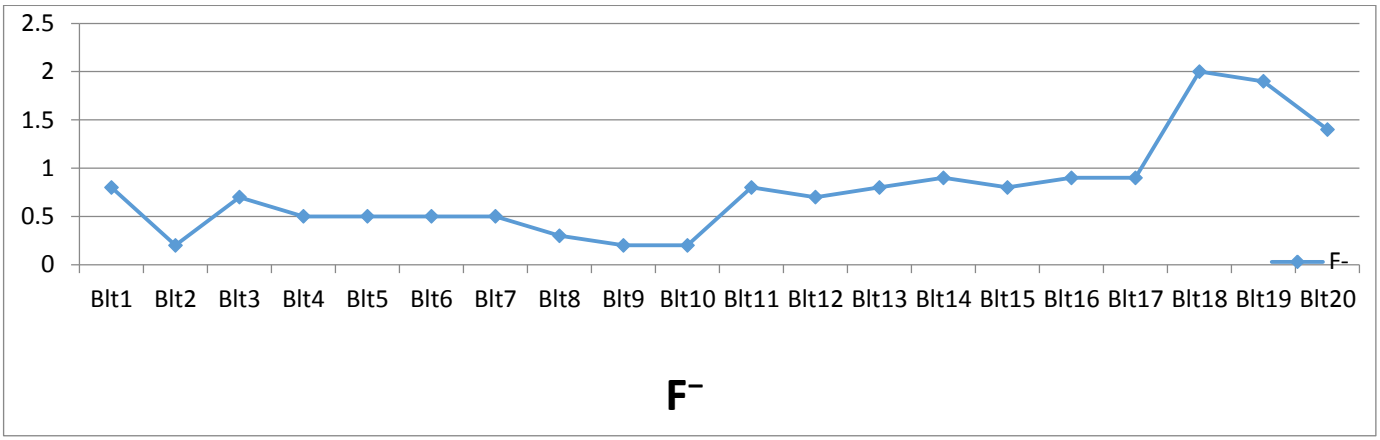
Chloride (Cl^-)

Excessive chloride gives a salty taste to water and people, who are not accustomed to high chloride, may be subjected to lenitive effects. The chloride content in the study area ranged between 190 to 4400 mg/L .The BIS permissible limit of chloride for drinking water is 250 to 1000 mg/L. The chloride value of 35 % water samples belong to permissible limit while 65 % are out of permissible limit.



Fluoride (F^-)

Long term use of groundwater of drinking has resulted in the onset of widespread fluorosis, from mild forms of dental fluorosis to crippling skeletal fluorosis. The concentration of fluoride in the study area varies from 0.2 to 2.0 mg/L. The fluoride value of the water samples is well within the permissible limit for 18 samples, whereas 2 samples have high value of fluoride (above 1.5 mg/L) and, thus not safe for drinking purpose.



IV. CONCLUSION

Recently, District Barmer, Rajasthan is facing a number of groundwater issues, such as water shortages, locally high pollution, and low recharge and over exploitation of the resource. The major sources of pollution in the study area are poor unregulated landfills, contaminated from industry and drain systems. All of these problems will only become worse unless steps are taken in the very near future. It is expected that the present study will provide some guideline for the development of a comprehensive water management.

V. RECOMMENDATIONS FOR WATER QUALITY ASSESSMENT

Regular monitoring of the water should be done. The results of the analysis of water should be published for the purpose of record and benefit of public. Strict laws should be imposed on the industries which release their effluents directly into the water. Regular monitoring of small scale industries which are also a major contributor for polluting the surface water and ultimately contaminates the ground water. Educating the people about the various problems specially the labor class that works in industries will also help to clean the environment as the best way to manage the environment, is to manage ourselves.

REFERENCES

[1]. .Avinash V. Karne and Prabhakar D. Kulkarni, Nature Environ. Poll. Tech., **8(2)**, 247 (2009).
[2]. WHO, 2nd Edition, I. Recommendation, World Health Organization (1998).
[3]. Jayalakshmi Devi, O. Belagali, S. L. Ramswamy and S. N. Janardhana, Indian J. Environ. Ecoplan., **10(2),** 45 (2005).
[4]. N. Milenkovic, M. Damjanovic, and M. Ristic, "Study of heavy metal pollution in sediments from the iron gate (danuae river), serbia and montenegro," Polish Journal of Environmental Studies, vol. 14, pp.781-787, June 2005.
[5]. S. Jit, "Evaluation of hexachlorocyclohexane contamination from the last lindane production plant operating in India," Environmental Science and Pollution Research, vol. 18, pp. 586-597, April 2010.
[6]. A. Nestler, "Isotopes for improved management of nitrate pollution in aqueous resources: review of surface water field studies," Environmental Science and Pollution Research, vol. 18, pp. 519-533, January 2011.
[7]. E. Bacci, A. Franchi, L. Bensi, and C. Gaggi, "Pesticides and groundwater quality protection," Environmental Science and Pollution Research, vol. 1, pp. 94-97, 1994.
[8]. E. Helios-Rybicka, "Distribution of pollutants in the Odra river system. Part I. General description of the International Odra Project (IOP)," Polish Journal of Environmental Studies, vol. 11, pp. 649-654, July 2002.
[9]. G. Guo, F. Wu, F. Xie and R. Zhang, "Spatial distribution and pollution assessment of heavy metals in urban soils from southwest China," Journal of Environmental Sciences, vol. 24, pp. 410–418, March 2012

