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PHYSICO -CHEMICAL ANALYSIS OF SOIL ADJACENT TO A DUMPING SITE OF MUNCIPAL WASTE

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ABSTRACT

As a result of increasing urbanization and rising population levels, the amount of solid trash that is generated in metropolitan areas around the world has experienced a dramatic uptick. Sometimes hazardous wastes from household and industrial chemicals that should be disposed of in hazardous waste dumps get up in municipal landfills instead. These landfills are designed specifically for the disposal of hazardous trash. After these wastes are disposed of in a landfill, the chemicals in them have the potential to seep into the earth and groundwater through precipitation and surface runoff. The organic material, inorganic salts, and heavy metals found in leachate are present in high concentrations. Disposal of municipal solid waste (MSW) in an unscientific manner has the potential to have a negative effect on all aspects of the ecosystem as well as human health. It is of the utmost importance to conduct leachate, groundwater, and soil monitoring in order to ascertain the level of contamination and to devise appropriate remediation strategies. Monitoring of several physicochemical and biological characteristics was used to determine whether or not there was a deterioration in the quality of the groundwater found in close proximity to MSW disposal sites.

Keywords: Chemical, Soil Adjacent, Dumping Site, Municipal Waste

INTRODUCTION

The tremendous rise in the production of municipal solid garbage in India may be attributed to the country's rapidly expanding population as well as its more Westernized lifestyle (MSW). It includes garbage from homes as well as businesses, however this type of waste makes up a very little portion of the overall stream of solid waste in industrialized countries. The accumulation of a significant volume of garbage may give rise to a number of issues for the communities that are currently located there. The rise in population has been one factor that has contributed to an increase in the quantity as well as the diversity of garbage. If the garbage is not collected, transported, and handled appropriately, it can cause a variety of issues, many of which are connected to both the health of humans and the environment in which they live. Open landfills and direct dumping made up the bulk of municipal solid waste management. It has been noted, sadly, that developing nations where trash is deposited directly in ways that are both unscientific and unmanaged can be harmful to the ecosystem of metropolitan areas.

GROUND WATER WHEN PRECIPITATION

This is a double whammy for the ecosystem. Leachate can escape the dumping site in a horizontal or vertical direction and contaminate the ground water when precipitation, water that was previously present in the waste, or water produced by biodegradation all contribute to the penetration of water into the waste. Because of the enormous role that it plays in protecting the environment, the influence that leachate has on groundwater and other types of water resources has received a lot of attention in recent years. If groundwater resources are not appropriately managed, leachate migration from wastes sites or landfills and the discharge of contaminants from sediments (under specific conditions) represent a considerable danger. There is a significant reliance on groundwater for water supply in both the urban and the rural parts of India; yet, in the cities there is also access to pipe-borne water. In rural areas, residents typically have to rely on hand-dug wells as their primary source of potable water supply due to the fact that streams typically dry up in the summer season. This valuable resource is in danger of becoming polluted as a result of human lifestyle, which is exemplified by the lack of cleanliness that is practised in countries that are still in the process of developing. The significance of water quality on human health has

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recently gained a lot of attention, which has led to the protection of groundwater being one of the most pressing environmental concerns.

CHEMICAL AND PHYSICAL

The latest research in Jabalpur (India) revealed that it is the greater rate of exploitation of groundwater than its recharge, incorrect disposal of solid and liquid wastes are the primary reasons of deterioration of ground water quality. Therefore, it is necessary to search for some helpful indicators, both chemical and physical, that can be used to monitor both the functioning of drinking water systems and the performance of those systems. As a result, the focus of the current inquiry is on determining the quality of the groundwater (drinking water) that is located in close proximity to municipal solid waste dumping sites in Jabalpur. There is a significant reliance on groundwater for water supply in both the urban and the rural parts of India; yet, in the cities there is also access to pipe-borne water.

In rural areas, residents typically have to rely on hand-dug wells as their primary source of potable water supply due to the fact that streams typically dry up in the summer season. This valuable resource is in danger of becoming polluted as a result of the way humans live their lives, which is exemplified by the poor degree of cleanliness that is practised in the developing nation. The significance of water quality on human health has recently gained a lot of attention, which has led to the protection of groundwater being one of the most pressing environmental concerns. Recent research conducted in Jabalpur, India, came to the conclusion that the main factors contributing to a decline in the quality of ground water are an excessive rate of groundwater extraction relative to the rate at which it is being replaced, as well as the improper disposal of solid and liquid wastes.

OBJECTIVE

1. To study on the physico -chemical analysis of soil adjacent to a dumping site of muncipal waste
2. To study on the communities that are currently located

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REVIEW OF LITERATURE

Sharma et al., 2018, The state of Kerala has the highest human development index in all of India; in addition, the state is currently undergoing the phase of urban development; and the state faces critical issues related to the improper management of solid waste as a result of severe constraints on the availability of land, a dense population, and environmental fragility (Varma, 2013). It is more difficult to treat the municipal solid waste in Kerala due to the high average moisture content and the low average calorific value (Pawels & Tom, 2013). The majority of the currently available methods in the state for the treatment of municipal solid waste have failed, which has increased the negative impacts.

Baun et al., 2000, There is a correlation between the age of the dumping site and both the quantity and the quality of the leachate that is produced at the site. The type of waste that is being dumped, the moisture content of the waste, the site hydrology, the degree to which solid waste is stabilised, the climatic conditions, the age of the landfill, and the stage of decomposition in the landfill are the primary factors that determine the quality of the leachate that is produced (Abood et al., 2013).

Kjeldsen et al., 2002, Acids that have collected over the landfill's maturation process (the methanogenenic stage) (Renou et al., 2008). The leachate that is produced during this phase has a concentration that is low in COD, while also having concentrations that are high in ammonium nitrogen and methane. In addition to this, the ratio of BOD5 to COD got lower as the amount of carboxylic acid got lower and the number of resistant organic molecules got higher (Kjeldsen et al., 2002).

Huanjung et al. (2006), who investigated the quality of landfill leachate at three different types of landfills, leachates contained high concentrations of the chemical oxygen demand, total dissolved solids, volatile suspended solids, total organic carbon, electrical conductivity, and heavy metals such as Fe, Ni, and Cr. Due to the leakage of leachate, a complex mixture of pollutants with a high organic and inorganic content and lasting toxicological characteristics, municipal solid waste dumping sites are considered to be significant sources of soil and groundwater pollution.

Han et al., 2016; Sharma et al., 2018, In addition, garbage that is dumped in a landfill produces leachate, which then moves away from the landfill and into the hydrogeological

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system, damaging soil and groundwater resources in the process. Leachate is carried to the ground by gravity, where it percolates through the layer of soil underneath it, and eventually into the underground aquifer system.

Fatta et al., 2002, The leachate that seeps into the ground from landfills can contaminate groundwater in India. Mor et al. (2006) conducted an investigation into the quality of groundwater in the area surrounding the Gazipur landfill site in Delhi. The findings of their study revealed that the presence of a high concentration of EC, TDS, Cl-, SO4 2, NO3 -, Na+, Fe, and coliform bacteria in groundwater samples reduces the water's suitability for drinking and other domestic uses. The Bureau of Indian Standards determined that the concentration of majority of the water quality indicators in the area surrounding three unlined dump sites in Erode city was higher than the level that was set for it (Nagarajan et al., 2012).

RESEARCH METHODOLOGY

The global positioning system, often known as GPS, was utilised to acquire precise sample location data, expressed in terms of latitude and longitude, for the purpose of future reference. Before any samples were collected, the containers holding the samples and the equipment used to collect them were meticulously cleaned. The appropriate information, such as the sample type, sample code, and date of sampling, was written on the labels that were affixed to the containers. It was noticed that particulars of the sampling sites as well as specific qualities of the samples were recorded. Clean plastic containers of 1 litre capacity were used for the collection of water samples prior to their subsequent measurement of physicochemical characteristics. For the purpose of determining the amount of dissolved oxygen and the amount of oxygen that is required for biological reactions, samples were collected in glass containers. The containers were washed with the sample two or three times to remove any remaining residue. be investigated. In the field, measurements were taken to determine the in-situ characteristics such as pH, temperature, and electrical conductivity. In order to prevent contamination from outside sources, samples for the bacteriological analysis were stored in sterilised containers during collection. These containers were then transferred to the laboratory in a cold box that contained ice packs.

DATA ANALYSIS

Due to the fact that it is significantly less likely to become polluted and has a great capacity

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for storage, groundwater has been recognised for a long time as an essential water supply. Groundwater is relatively safe and trustworthy when compared with surface water (Gupta, 2014). (Gupta, 2014). However, during the past few years, there has been a worrying trend toward a decline in the quality of the groundwater. The improper and unscientific disposal of municipal solid waste across large regions poses a significant risk to the quality of the groundwater, as well as to the environment and the health of the population (Soupios et al., 2006; Ganiyu et al., 2016). The quantity and quality of waste that is created, as well as the quality of water that is replenished, sewage treatment, and subsurface geochemical processes, all have an impact on the quality of groundwater (Rizwan & Gurdeep, 2010; Ganiyu et al., 2016). Open dumping or landfilling is the most popular method utilised to dispose the garbage due to its beneficial economics (Wijesekara et al., 2014). (Wijesekara et al., 2014). The leachate that was produced.

RESULTS AND DISCUSSION

Physico-chemical and bacteriological characteristics of groundwater samples at Njeliamparamba

The statistical analysis of the physicochemical and bacteriological features of groundwater samples is shown in Tables 4.1 to 4.4 below. The findings of the study may be found in these tables. The descriptive statistics of the groundwater quality are displayed in Table 4.5, together with the allowed limits for a variety of parameters according to the BIS (2012), and the number of wells that exceed the limit.

Table 1 Physico-chemical and bacteriological characteristics of the groundwater samples at Njeliamparamba

Sample ID	NP-1	NP-2	NP-3	NP-4	NP-5	NP-6	NP-7
pH	5.40±0.06	5.84±0.02	5.34±0.03	6.20±0.05	5.20±0.01	5.24±0.02	6.05±0.02
EC, µS/cm	1250.0±52.7	1230.0±10	1145.0±12.0	850.0±13.23	1420±23.0	1415.0±7.64	960±3.61
TDS, mg/L	887.50±11.	873.3±8.70	813.66±5.0	603.50±3.6	1008.0±5.0	1004.65±6.	681.6±3.53

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	3			0		0	
Sulphate, mg/L	80.60±1.5	65.60±2.0	64.0±2.0	20.50±2.06	75.0±1.50	47.40±3.06	45.0±1.53
Chloride, mg/L	200.0±5.0	190.50±3.0	185.0±4.50	115.0±2.65	252.60±4.73	252.50±3.29	170.0±3.16
Total Alkalinity, mg/L	210.0±3.10	251.0±5.78	147.0±3.20	106.0±4.64	181.50±6.15	189.50±2.80	109.80±2.06
Total Hardness, mg/L	420.0±2.0	371.0±2.43	351.0±4.20	441.0±3.53	287.0±3.62	231.0±3.21	168.0±3.51
Calcium, mg/L	101.50±1.50	76.0±1.10	90.0±1.10	73.0±2.62	96.70±1.70	76.50±1.01	65.0±1.71
Magnesium, mg/L	50.50±1.50	46.0±1.10	40.0±1.53	52.0±0.78	40.0±1.21	28.50±0.76	25.60±1.27
Sodium, mg/L	111.0±1.60	130.0±2.42	145.0±2.89	87.0±2.80	101.60±2.6	75.50±1.32	96.0±1.69
Potassium, mg/L	50.0±2.50	25.0±1.53	16.50±1.66	40.0±1.74	51.50±1.0	34.50±2.08	40.0±2.52
COD, (mg/L)	70.0±2.50	50.0±2.73	85.0±2.52	85.0±2.52	255.50±2.5	250.0±2.52	85.0±2.08
BOD, (mg/L)	8.0±1.20	7.0±0.60	4.50±1.30	3.60±1.0	8.50±5.60	9.0±4.90	4.20±2.0
Phosphate-P,(mg/L)	0.20±0.01	0.15±0.01	0.05±0.01	0.10±0.03	0.05±0.02	0.10±0.02	0.16±0.01

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Nitrate, (mg/L)	3.50±0.67	18.50±0.75	20.50±1.56	11.50±0.53	90.6±1.06	51.50±0.90	40.0±3.06
Iron, (mg/L)	0.35±0.02	0.40±0.02	0.35±0.01	0.34±0.02	0.29±0.02	0.35±0.03	0.25±0.02
Copper, (mg/L)	0.02±0.001	0.03±0.001	BDL	0.01±0.001	0.06±0.002	0.045±0.001	0.01±0.001
Zinc, (mg/L)	0.04±0.002	0.03±0.001	0.10±0.002	0.01±0.001	BDL	BDL	0.01±0.001
Manganese, (mg/L)	0.05±0.02	0.04±0.09	0.04±0.01	0.02±0.02	0.04±0.02	0.06±0.02	0.12±0.02
Cadmium, (mg/L)	0.003±0.001	0.001±0.009	BDL	0.003±0.008	BDL	BDL	BDL
Lead, (mg/L)	0.02±0.001	0.015±0.001	0.008±0.002	0.008±0.003	0.02±0.002	0.025±0.001	0.009±0.002
Nickel, (mg/L)	0.01±0.003	0.006±0.001	0.009±0.002	BDL	0.01±0.001	0.015±0.001	BDL
TCF, (MPN/100ml)	≥2400	1100	460	1100	≥2400	≥2400	23
E.coli	Present	Absent	Present	Absent	Absent	Present	Absent

BDL-Below Detection Limit, COD- Chemical Oxygen Demand, BOD- Biochemical Oxygen Demand, TCF-Total Coliforms

Table 2 Physico-chemical and bacteriological characteristics of the groundwater samples at Njeliamparamba

Sample ID	**NP-8**	**NP-9**	**NP-10**	**NP-11**	**NP-12**	**NP-13**	**NP-14**
pH	5.36±0.02	5.84±0.02	5.45±0.10	5.30±0.04	6.80±0.10	6.56±0.01	6.45±0.04

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EC, (µS/cm)	1626.0±10.4	1538.0±9.0	560.0±6.0	890.0±8.1	440.0±5.6	300.0±6.5	553.0±6.10
TDS, (mg/L)	1154.0±9.0	1092.0±9.6	397.60±5.0	631.90±5.53	312.0±4.53	213.0±2.0	392.63±2.50
Sulphate, (mg/L)	70.0±1.0	78.0±1.53	22.0±1.0	17.50±1.65	18.0±2.08	1.05±0.79	35.60±0.65
Chloride, (mg/L)	252.0±4.93	260.5±4.04	80.30±2.5	180.0±4.62	101.0±2.65	85.0±4.36	95.40±2.69
Total Alkalinity, (mg/L)	201.0±4.18	251.0±2.39	48.0±1.3	90.9±2.17	11.80±3.27	22.58±0.64	45.90±3.41
Total Hardness, (mg/L)	371.0±9.13	280.0±2.46	100.0±3.2	220.0±1.32	70.20±1.06	45.0±0.76	95.80±0.99
Calcium, (mg/L)	98.7±1.80	60.50±1.10	30.20±1.0	45.60±1.31	42.30±0.42	18.09±0.45	33.60±1.0
Magnesium, (mg/L)	55.6±0.95	40.30±1.69	13.70±0.80	20.50±1.50	11.90±0.26	11.58±0.12	12.50±0.72
Sodium, (mg/L)	102.0±6.86	171.0±5.50	50.50±2.0	110.50±3.33	44.50±1.26	26.80±1.42	75.50±1.50
Potassium, (mg/L	66.50±6.25	142.0±2.35	20.0±1.20	35.0±2.42	18.50±1.63	3.60±0.44	25.0±3.30
COD, (mg/L)	252.6±2.52	40.0±2.08	82.50±3.0	80.50±3.21	40.50±2.71	23.40±2.08	41.50±3.06
BOD,	10.0±6.0	9.50±0.90	3.0±0.90	3.60±1.0	1.50±0.50	1.80±0.20	1.60±0.60

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(mg/L)							
Phosphate-P,(mg/L)	0.01±0.01	0.10±0.04	0.25±0.40	0.20±0.03	0.30±0.03	0.15±0.02	0.15±0.03
Nitrate, (mg/L)	50.5±1.80	20.60±1.31	35.60±1.20	30.0±1.53	10.5±1.27	5.50±1.76	10.40±1.53
Iron, (mg/L)	0.24±0.02	0.52±0.02	0.30±0.01	0.12±0.01	BDL	0.09±0.001	0.012±0.01
Copper, (mg/L)	0.02±0.001	0.003±0.01	BDL	BDL	BDL	0.01±0.002	BDL
Zinc, (mg/L)	0.01±0.001	0.01±0.001	BDL	0.01±0.002	0.03±0.02	0.02±0.003	0.01±0.002
Manganese, (mg/L)	0.15±0.02	0.15±0.02	0.08±0.10	0.07±0.001	BDL	0.01±0.01	0.02±0.001
Cadmium, (mg/L)	0.002±0.008	0.001±0.009	BDL	BDL	BDL	BDL	BDL
Lead, (mg/L)	0.022±0.001	0.02±0.001	BDL	0.008±0.002	BDL	BDL	BDL
Nickel, (mg/L)	0.016±0.001	0.008±0.002	BDL	0.009±0.001	BDL	BDL	BDL
TCF, (MPN/100 ml)	≥2400	≥2400	≥2400	≥2400			≥2400
E.coli	Present	Present	Absent	Absent	Absent	Absent	Absent

BDL-Below Detection Limit, COD- Chemical Oxygen Demand, BOD- Biochemical Oxygen Demand, TCF-Total Coliforms

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Table 3 Physico-chemical and bacteriological characteristics of the groundwater samples at Njeliamparamba

Sample ID	NP-15	NP-16	NP-17	NP-18	NP-19	NP-20	NP-21
pH	6.01±0.03	6.54±0.01	6.42±0.02	5.40±0.10	6.67±0.01	6.85±0.01	5.02±0.02
EC, (μS/cm)	870.0±7.6	305.0±5.0	600.0±14.0	1398.0±10.0	367.0±6.5	181.3±3.1	1290.0±10.50
TDS, (mg/L)	617.70±2.65	216.55±4.40	426.0±4.0	992.58±4.04	260.57±2.30	128.72±2.0	916.0±7.6
Sulphate, (mg/L)	58.20±1.51	23.50±1.74	50.50±7.64	90.0±3.06	12.80±0.8	1.76±0.40	60.0±1.0
Chloride, (mg/L)	158.20±2.89	50.30±2.21	95.60±5.50	250.5±2.50	78.95±1.0	54.72±0.80	251.20±2.50
Total Alkalinity, (mg/L)	110.50±2.35	40.80±1.63	100.90±6.30	102.8±2.01	55.68±1.0	12.24±0.70	135.60±1.30
Total Hardness, (mg/L)	370.50±2.02	49.90±1.52	109.502.36	371.0±5.51	50.0±1.20	30.50±0.90	130.0±1.0
Calcium, (mg/L)	89.60±2.31	20.50±0.85	36.80±1.10	80.56±2.03	19.20±0.6	14.80±0.20	78.50±2.0
Magnesium, (mg/L)	30.50±1.0	10.60±0.15	18.75±1.14	39.6±1.20	12.92±0.50	2.97±0.20	35.50±1.0
Sodium, (mg/L)	85.60±2.0	21.50±2.65	56.0±1.53	80.50±2.08	36.80±0.80	10.20±0.10	105.0±3.80
Potassium,	35.0±2.31	22.60±0.7	18.9±0.50	35.50±4.7	13.60±0.6	4.50±0.80	36.50±1.30

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(mg/L)		0		0	0		
COD, (mg/L)	35.0±1.53	15.60±2.65	30.0±5.52	251.0±3.61	15.70±0.80	18.5±0.50	101.50±3.56
BOD, (mg/L)	4.0±0.90	1.0±0.35	2.30±0.65	10.0±6.50	1.30±0.20	1.0±0.01	6.50±2.10
Phosphate-P,(mg/L)	0.1±0.02	0.10±0.03	0.30±0.03	0.35±0.02	0.15±0.01	0.10±0.001	0.09±0.001
Nitrate, (mg/L)	0.75±0.10	1.0±0.15	1.50±0.15	55.60±1.21	6.55±0.01	BDL	5.50±0.60
Iron, (mg/L)	0.1±0.02	0.10±0.03	0.10±0.03	0.15±0.02	BDL	BDL	0.25±0.05
Copper, (mg/L)	BDL	BDL	BDL	0.03±0.002	BDL	BDL	0.03±0.005
Zinc, (mg/L)	0.04±0.02	0.10±0.03	0.01±0.02	0.04±0.02	BDL	BDL	2.50±070
Manganese, (mg/L)	0.10±0.02	0.01±0.01	0.10±0.02	0.15±0.02	BDL	BDL	0.15±0.02
Cadmium, (mg/L)	0.0002±0.02	BDL	BDL	0.0025±0.01	BDL	BDL	0.0025±0.0001
Lead, (mg/L)	0.01±0.001	BDL	BDL	0.02±0.001	BDL	BDL	0.015±0.003
Nickel, (mg/L)	0.007±0.001	BDL	BDL	0.01±0.001	BDL	BDL	0.008±0.002
TCF, (MPN/100ml)	≥2400	210	460	≥2400	93	23	≥2400

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E.coli	Absent	Absent	Absent	Present	Present	Absent	Present

BDL-Below Detection Limit, COD- Chemical Oxygen Demand, BOD- Biochemical Oxygen Demand, TCF-Total Coliforms

Table 4 Physico-chemical and bacteriological characteristics of the groundwater samples at Njeliamparamba

Sample ID	NP-22	NP-23	NP-24	NP-25	NP-26	NP-27	NP-28	NP-29
pH	6.37±0.01	6.54±0.04	6.06±0.01	6.70±0.03	5.13±0.02	7.25±0.02	7.04±0.01	6.84±0.02
EC, (µS/cm)	336.0±5.5	199.60±1.5	195.80±2.3	1280.0±7.0	402.0±1.1	279.0±3.6	285.0±4.3	352.0±4.60
TDS, (mg/L)	238.56±3.3	141.72±3.0	139.0±1.20	909.0±8.2	285.42±4.0	198.09±2.0	202.35±3.5	249.92±2.0
Sulphate, (mg/L)	18.96±0.6	15.80±0.8	3.76±0.50	49.80±1.09	12.80±0.50	10.12±0.10	14.16±0.12	24.80±1.0
Chloride, (mg/L)	61.35±1.0	49.81±1.0	56.93±1.50	164.64±4.0	81.16±2.0	54.72±2.30	71.10±3.10	64.04±2.20
Total Alkalinity,								
(mg/L)	51.04±2.0	28.56±1.0	20.40±1.0	137.20±3.30	70.16±2.50	51.03±1.50	16.32±0.60	48.96±1.10
Total Hardness, (mg/L)	65.5±3.50	35.40±0.90	30.0±1.30	124.50±2.80	45.60±1.0	40.7±1.30	38.9±1.20	66.8±2.30
Calcium, (mg/L)	27.20±0.90	11.20±0.20	4.80±0.50	64.0±3.0	64.60±1.80	12.80±0.30	17.60±0.50	24.40±1.0

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Magnesium, (mg/L)	10.69±0.22	0.97±0.001	3.89±0.35	40.50±1.60	34.40±1.60	6.77±0.20	6.80±0.35	10.69±0.80
Sodium, (mg/L)	26.80±1.0	10.20±0.02	10.20±2.10	85.60±2.50	36.80±1.25	26.80±1.10	36.80±1.50	21.50±1.50
Potassium, (mg/L)	13.60±0.25	4.50±0.5	4.50±0.50	35.0±0.80	13.60±0.80	13.60±0.50	13.60±0.60	22.60±1.0
COD, (mg/L)	15.70±0.20	15.50±2.0	18.50±1.10	55.0±3.10	15.70±1.50	15.70±0.85	15.70±0.50	15.60±0.45
BOD, (mg/L)	1.60±0.15	1.50±0.20	0.98±0.60	8.0±2.50	1.0±0.10	1.20±0.12	1.05±0.10	1.0±0.10
Phosphate-P,(mg/L)	0.15±0.01	0.10±0.01	0.10±0.40	0.10±0.20	0.15±0.25	0.15±0.22	0.15±0.10	0.10±0.08
Nitrate, (mg/L)	6.55±0.05	BDL	BDL	0.75±0.10	4.55±2.0	3.55±1.8	6.55±1.5	1.0±0.08
Iron, (mg/L)	BDL	0.10±0.02	0.10±0.01	0.10±0.01	BDL	BDL	BDL	BDL
Copper, (mg/L)	BDL	BDL	BDL	0.02±0.003	BDL	BDL	BDL	BDL
Zinc, (mg/L)	BDL	BDL	BDL	1.65±0.12	BDL	BDL	BDL	0.10±
Manganese, (mg/L)	BDL	0.09±0.001	BDL	0.08±0.002	BDL	BDL	BDL	BDL
Cadmium, (mg/L)	BDL	BDL	BDL	0.002±0.0002	BDL	BDL	BDL	BDL
Lead,	BDL	BDL	BDL	0.016±0.00	BDL	BDL	BDL	BDL

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(mg/L)				2				
Nickel, (mg/L)	BDL	BDL	BDL	0.006±0.004	BDL	BDL	BDL	BDL
TCF, (MPN/100 ml)	460	210	150	≥2400	93	23	210	23
E.coli	Absent	Absent	Absent	Present	Absent	Absent	Absent	Absent

BDL-Below Detection Limit, COD- Chemical Oxygen Demand, BOD- Biochemical Oxygen Demand, TCF-Total Coliforms

The 29 groundwater samples that were obtained in the area of Njeliamparamba had pH values ranging from 5.020.02 to 7.250.02, and electrical conductivity values ranging from 181.03.1S/cm to 1626.010.4S/cm, respectively. These values were determined using the electrical conductivity. It was determined that 69 percent of the samples had an acidic make-up, while the remaining samples were within the range of values that were considered acceptable by the Bureau of Indian Standards (BIS, 2012). The groundwater samples had total dissolved solid values that varied from 128.722.0 mg/L in NP-20 to 1154.09.0 mg/L in NP-8. In 48% of the total samples that were analysed, the TDS value was higher than the permissible level of 500 mg/L that had been suggested by the Bureau of Indian Standards for drinking water. A high total dissolved solids content in the samples taken from the groundwater suggests that salts may have been leached from MSW leachate. It's possible that the water, together with the leachate, will filter into the groundwater, which might cause the TDS readings to rise. Table 4.5 presents the results of Davis and De Wiest's (1966) endeavour to classify groundwater samples in accordance with their TDS levels).

CONCLUSION

One of the most significant environmental challenges that the world is currently facing, particularly in developing nations, is how to get rid of municipal solid garbage. The most significant environmental issue that is linked with a site for the disposal of municipal solid waste is the potential threat provided by leachate migration and the subsequent deterioration of the soil and water quality. This is because leachate migration can potentially provide a

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threat to the environment (MSW). Monitoring the many different physicochemical and biological data, we carried out an investigation on the deterioration of groundwater quality in the areas surrounding MSW disposal sites. After collecting a total of 59 groundwater samples from the four designated MSW dumping sites in Kerala, it was found that Njeliamparamba had the greatest amount of pollution. This was the area that had been found to have the most waste (Njeliamparamba, Laloor, Pettipalam and Vellaramkunnu).

REFERENCE

1. Abd El-Salam, M.M., & Abu-Zuid, G.I. (2014). Impact of landfill leachate on the groundwater quality: A case study in Egypt. Journal of Advanced Research, 6, 579–586.

2. Abdelwahab, O., Amin, N.K., & El-Ashtoukhy, E.S.Z. (2009). Electrochemical removal of phenol from oil refinery wastewater. Journal of Hazardous Materials, 163, 711–716.

3. Abood, A. R., Bao, J., Abudi, Z. N., Zheng, D., & Gao, C. (2013). Pretreatment of non-biodegradable landfill leachate by air stripping coupled with agitation as ammonia stripping and coagulation–flocculation processes. Clean Technologies and Environmental Policy, doi: 10.1007/s10098-012- 0575-1.

4. Adamcová, D., Vaverková, M. D., Barton, S., Havlícek, Z., & Broušková, E. (2016). Soil contamination in landfills: a case study of a landfill in Czech Republic. Solid Earth, 7, 239–247.

5. Adamczyk-Szabela, D., Markiewicz, J., & Wolf, W. M. (2015). Heavy metal uptake by herbs. iv. influence of soil ph on the content of heavy metals in valeriana officinalis L.Water. Air and Soil Pollution, 226, 106. doi: 10.1007/s11270-015-2360-3

6. Adeolu, A.O., Ada, O. V., Gbenga, A.A., & Adebayo, O. A. (2011). Assessment of groundwater contamination by leachate near a municipalsolid waste landfill. African Journal of Environmental Science and Technology, 5(11), 933-940.

7. Adesodun, J. K., Atayese, M. O., Agbaje, T. A., Osadiaye, B. A., Mafe, O. F., &

Santosh Kumar Sharma *, *University Department of Botany: B.R.A. Bihar University, Muzaffarpur. India*

Soretire, A.A. (2010). Phytoremediation potentials of sunflowers (Tithonia diversifolia and Helianthus annus) for metals in soils contaminated with zinc and lead nitrates. Water, Air and Soil Pollution, 207, 195-201.

8. Adriano, D. C. (2001). Trace elements in terrestrial environments. Biogeochemistry, bioavailability and risks of metals. New York: SpringerVerlag, 867

9. Agridiotis, V., Forster, C.F., & Carliell-Marquet, C. (2007). Addition of Al and Fe salts during treatment of paper mill effluents to improve activated sludge settlement characteristics. Bioresource Technology, 98, 2926–2934.

10. Akinbile, C. O. & Yusoff, M.S. (2011). Environmental impact of leachate pollution on groundwater supplies in Akure, Nigeria. International Journal of Environmental Science and Development, 2(1), 2010-0264.

11. Akinbile, C.O. (2012). Environmental impact of landfill on groundwater quality and agricultural soils in Nigeria. Soil and Water Research. 7, 18–26. Aksu, Z. (2002). Determination of the equilibrium, kinetic and thermodynamic parameters of the batch biosorption of nickel (II) ions onto Chlorella vulgaris. Process Biochemistry, 38, 89–99.

12. Akyol, A. (2012). Treatment of paint manufacturing wastewater by electrocoagulation. Desalination, 285, 91–99.

13. Alam, S. M., Naqvi, S. S., & Ansari, M. R. (1999). Impact of soil pH on nutrient uptake by crop plants. In M. Pessarakli (Ed.), Handbook of plant and crop stress. New York: Marcel Dekker, 51–60.

14. Al-Hanbali, A., & Kondoh, A. (2008). Groundwater vulnerability assessment and evaluation of human activity impact (HAI) within the Dead Sea groundwater basin, Jordan. Hydrogeology Journal, 16(3), 499–510.

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