

Contamination Of Groundwater Quality Due To Municipal Solid Waste Disposalsite In Mayiladuthurai

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Abstract: In this study, the effect of leachates towards the groundwater quality was estimated with experimental determination from an open dumpsite. Water samples were collected around the mayiladuthurai dumpsite. The water samples were analyzed for various physical and chemical parameters such as pH, Electric conductivity, Acidity, Hardness, Chloride, Nitrate, Phosphate, Turbidity and Total solids. The concentration of Physical and Chemical constituents of water samples were compared with the WHO (World Health Organization) standard to fit for drinking water. The leachates of open dump yard directly contamination of ground water leading unfit for drinking water.

Keywords : Municipal Solid Waste, Dumping Yard, Ground Water Quality, Physio-Chemical Parameters.

I. INTRODUCTION

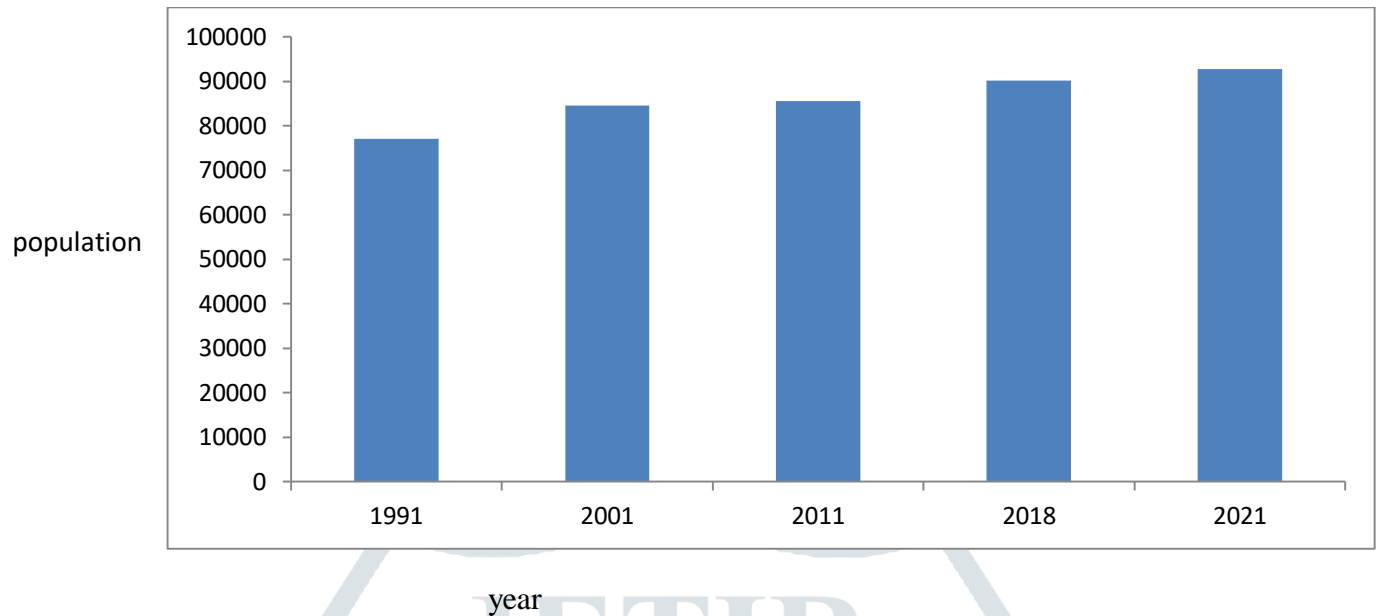
Solid waste management is the unwanted and discarded material. Managing waste properly is essential for building a suitable and liveable habitat but remains a challenge for any local body in India today. Rapid urbanization and changing life styles have led to the generation of huge amounts of garbage and waste in the urban areas. So, over the past few years. Just the handling this municipal solid waste has assumed the proportion of a major organizational, financial and environmental challenge[1]. The responsibilities of various ministries, departments and local bodies for sustainable solid waste management have been highlighted in the SWM rule 2016[2]. It has been emphasized that is the duty of local bodies to carry out the collection, transportation and disposal of solid waste in scientific manner on day to day basis[3]. Moreover, the duty of waste generators to segregate the waste at source as bio degradable and non bio degradable and handing Over the same to waste collectors authorized by the local bodies has also been prescribed[4].

In this study, a majority of populations in developing areas have health related problems to impact of the water in dumpsite area. Various physico chemical parameters were analyzed in leachate of ground water samples to understand the possible link of groundwater contamination[5].

Quantity Of Waste Generation

Mayiladuthurai municipality generates a total of 32.00 MT/Day of solid waste with a per capita generation of 270grms./day/person as shown in table: 1. In the whole town, all SWM processing activities is covered under three MCCs constructed different three locations. The residents in these area render their co-operation to ULB by practicing home composting at their backyards. However considering the total population of the town processing facilities are planned[6].

PROJECTION OF POPULATION AND WEIGHT CHART



II. STUDY AREA

The present studies of solid waste management were conducted by the vicinity of around the mayiladuthurai dumpsite[7]. It lies between the 11°6'N Latitude and 79°38'E Longitude. Mayiladuthurai municipality was constituted as a third grade municipality in the year 1866. It was upgraded as second grade in the year 1949 and as first grade municipality in the year 1969. It was later upgraded into selection grade municipality in the year 1984. It consists of 36 wards and 21867 households. The extent is about 11.27sq.km area. Mayiladuthurai is one of the towns of ancient historical importance in Tamilnadu. It consists of 324 streets of 117.202km length. The population of this municipality as per 2011 census is 85599 while the current population 2017 is (90112)[8].

TABLE: 3

Sample no	Sample place	Approximate distance	Source of water
1	Araya street	0	Bore water
2	Panjukar street	50m	Bore water
3	East pattamangala street	800m	Bore water
4	Compost in dumpsite place	950m	Bore water
5	Raja street	1km	Bore water
6	Thiruvizhandhur	1km	Bore water
7	Radhanallur	900m	Bore water
8	Kutta kula street	900m	Bore water
9	New bus stand near	100m	Bore water
10	Kalaignar kolani	100m	Bore water

III. SAMPLING METHODS

The water samples were collected from the ten different dumpsites located within the Mayiladuthurai. The samples were collected from randomly selected for this study within 3km radius from the centre of the dumpsite[9]. Three water samples were taken from each selected ground water points given a total of 30 samples. The physical parameters include Electric conductivity, PH, Turbidity. The chemical parameters include chloride, Hardness, Nitrate, Phosphate, acidity, Total solids. PH, Electric conductivity, and turbidity were determined using PH and conductivity meters and nitrate, phosphate was determined using spectrophotometer. While the other parameters were determined using titration method[10].

IV. RESULT AND DISCUSSION

The results both physico-chemical are present in table: 3, average values of physico-chemical parameters and this values of compared with WHO (World Health Organization) as shown in table[11].

TABLE: 3 COMPARED WITH WHO STANDARD

Parameters	Minimum	Maximum	Average	WHO standards
pH	6.22	6.97	6.482	6.5-8.5
EC	390	1137.5	712.403	500-2000
Chloride	50	316	139.2	250-1000
Hardness	160	460	305	300-600
total dissolved solids	100	1200	510	500-2000
Turbidity	2	94	15.55	5-10
Nitrate	13	38	26.7	45-100
Phosphate	0.108	0.785	0.505	0.5

CHART: 2

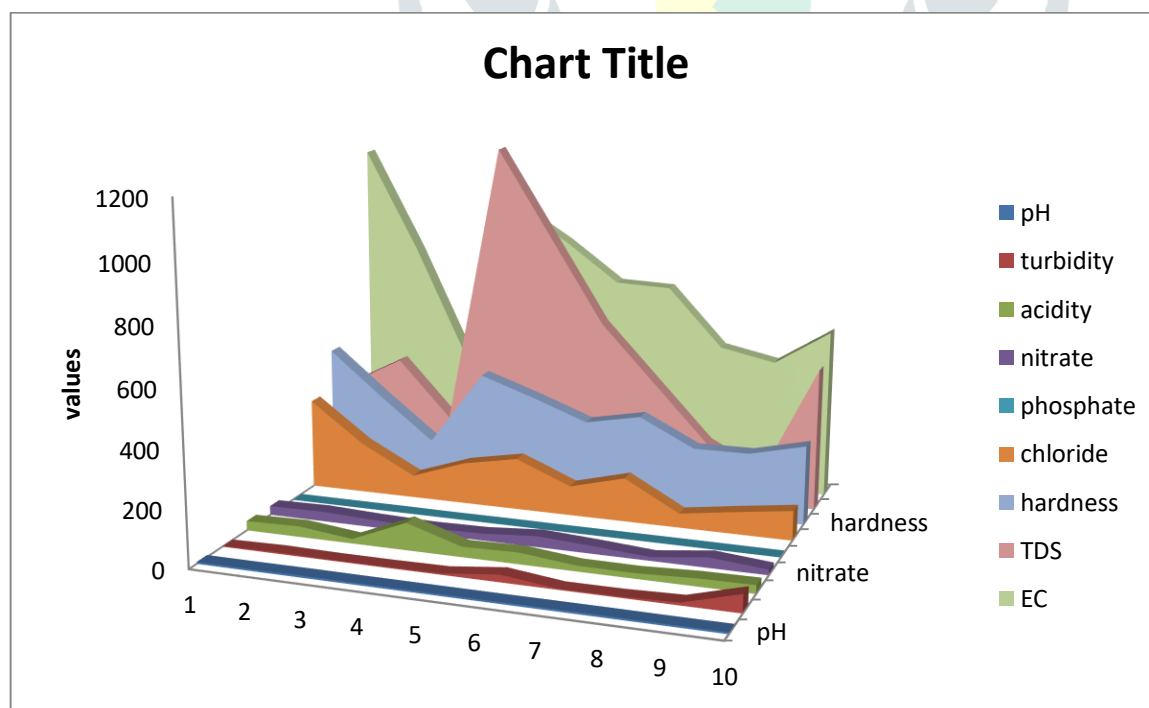


Fig.1 A diagram showing impact of leachate on TDS, pH,phosphate,nitrate,chloride,EC,Total hardness and acidity of groundwater

pH:

The pH of water samples range from 6.22 to 6.97. The pH is all the values of less than 7, so this indicates that the values of acidic in nature. The values of the WHO standard within the acceptable range of 6.5 to 8.5. There is fit for drinking purpose.

CHLORIDE:

The chloride of water samples range from 50mg/l to 316mg/l. the desirable limit of chloride is 250mg/l, and permissible limit of 1000mg/l. There are first samples is above the desirable limit. So this sample is not fit for drinking purpose. While the other samples within the acceptable range of WHO standards.

HARDNESS:

The hardness of water samples range from 160mg/l to 460mg/l. the desirable limit of hardness of water is 300mg/l and permissible limit of 600mg/l. There are first, second, fourth, fifth, seventh samples is above the desirable limit. So we can use for drinking purpose. This samples used for only agricultural and industrial purpose. The other samples within acceptable range of WHO standards.

ACIDITY:

The result of the indicates that the acidity has an range of 16mg/l to 95mg/l. The limit of acidity of water is 50mg/l. the sample four is above the acidity limit. While the other samples fit for drinking purpose.

EC:

The EC of bore water samples varies from 390 μ s/cm to 1137.5 μ s/cm. the high value of EC can be related to the effect of the leachates seepage mixed with the bore waters. The desirable limit of EC is 500mg/l and permissible limit of 2000mg/l. The first and ninth samples under the desirable limit. So it is fit for drinking purpose.

TURBIDITY:

The turbidity ranges from 2NTU to 94NTU. The BIS limits of turbidity 5-10NTU. The last samples is recorded were higher than the WHO standard value of 5NTU. This indicates that the samples not fit for drinking purpose.

TDS:

The TDS of water samples of range from 100mg/l to 1200mg/l. The desirable limit of TDS is 500mg/l and permissible limit of 2000mg/l. There are fourth, fifth, sixth, samples is above the desirable limit, so it is not fit for drinking purpose.

NITRATE:

The nitrate of water Samples of range from 13 to 38mg/l. The WHO standard limit of 45 to 100mg/l. all the values of under the desirable limit. There is fit for drinking purpose.

PHOSPHATE:

It is ranged from 0.108mg/l to 0.785mg/l. The WHO standard limit of 0.5mg/l. The samples one, three, five, eight, nine is above the limit of WHO standard. These indicate the values of not fit drinking purpose.

V. CONCLUSION:

The water samples were obtained from vicinity of mayiladuthurai dumpsite. The following parameters for tested from the water samples with using the laboratory. The chloride of first sample is above the desirable limit. The hardness of samples first, second fourth, fifth, seventh is above the desirable limit. This is used for only agricultural and industrial purpose. In acidity, sample four is above the acidity limit. This sample not fit for drinking purpose. The EC of water samples, can be related to the effects of the leachates seepage mixed with the bore waters. The turbidity of last sample is recorded were higher than the WHO standard value of 5 NTU.

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