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IMPACT OF NASHIK MUNICIPAL SOLID WASTE ON GROUND WATER

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ABSTRACT

Now days, population and urbanization increasing day by day and hence the production of solid waste are also increasing. Due to improper solid waste treatment or dumping of solid waste on open ground it is affecting the sub soil and underground water environment.

Thus study of impact of the solid waste dumping on subsoil and ground water environment need to be done. This study reveals effects of municipal solid waste dumping on ground water. The leachate percolating from subsoil to ground water continuously contaminating it.

To study and analyze impacts of percolated leachate on ground water quality,the ground water samples from different sources of water in locality. The physio-chemical character of those ground water samples such as P_H,TDS,TS, Alkalinity, Nitrogen, phosphorus etc.

Keywords: Ground Water, Landfill, Leachate, Municipal Solid Waste.

I. INTRODUCTION

India is developing country. The population of our country is also increasing day by day. Due to this increasing population, production of solid waste is increased. Nashik is the one of the major city of Maharashtra after the Mumbai and Pune. It is Pilli gram city as well as it is industrial and institutional centre of North Maharashtra. Due to the rapid growth of urbanization, the population of city going on increase day by day and due to the increase in population the production of solid waste is increased. Nashik city does not have the proper municipal solid waste system as per the guidance of Ministry of Environmental, India. Due to this improper solid waste management system, the environmental effect of the solid waste is occurred near the area of landfill site which is situated near the Pandavleni. Ground water contamination and sub soil contamination is one of the major problem in now day. When the rain water is coming contact with the solid waste landfill or when the solid waste loses its moisture leachate is generated. This leachate is main responsible source of polluting soil as well as ground water.

Solid waste is the solid or semisolid, non-soluble material (including gases and liquids) such as agricultural refuse, demolition waste, industrial waste, mining residues, municipal garbage. It may also be defined as total

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wastes in the form of papers, garbage, vegetables, plastic and other forms generated in the houses, factories, commercial centers and other places that is eventually transported to the municipal solid waste landfill. The increase in population and urbanization was also largely responsible for the increase in solid waste. Since the beginning, humankind has been generating waste, be it the bones and other parts of animals they slaughter for their food or the wood they cut to make their carts and with the progress of civilization, the waste generated became of a more complex nature. At the end of the 19th century the industrial revolution saw the riseof the world of consumers. Not only did the air get more and more polluted but the earth itself became more polluted with the generation of non-biodegradable solid waste.

With rising urbanization and change in lifestyle and food habits, the amount of municipal solid waste has been increasing rapidly and its composition changing. In 1947 cities and towns in India generated an estimated 6 million tonnes of solid waste; in 1997 it was about 48 million tonnes. More than 25% of the municipal solid waste is not collected at all; 70% of the Indian cities lack adequate capacity to transport it and there are no sanitary landfills to dispose of the waste. The existing landfills are neither well equipped nor well managed and are not lined properly to protect against contamination of soil and groundwater.

In Indian cities solid waste generation rate is increased. The average per capita solid waste generation in India has increase from 0.32kg/day in 1971-73 to 0.48kg/day in 1994. Daily per capita generation of municipal solid waste in India ranges from about 100gm in small towns to 500gm in large towns. The EPRIT in 1995 showed that 23 big Indian cities generate 11 million tonnes of solid waste every year. But now urban centers of India produce 1, 20,000 tonnes of solid waste each day; it is expected that it will reach 300 million tonnes per annum by the end of 2047. NEERI in 1996 carried out study over characterization of Indian municipal solid waste which contains large organic fraction (30-40 per cent), ash and fine earth (30-40per cent), paper (3-6per cent) along with that plastics glass and metal (each less than1per cent).

A] Landfill

A landfill is defined as a system that is designed and constructed to dispose of discarded waste by burial in land to minimize the release of contaminants to the environment.

Landfill

IJARSE
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B] Leachate

Leachate is a polluted liquid emanating from the base of the landfill, which contains innumerable organic and inorganic compounds. Leachate is the liquid that has percolated through solid waste in a landfill and has extracted soluble dissolved or suspended materials in the process. Ground water quality is significantly affected due to leachate. Leachate is the contaminated liquid that has percolated through solid waste in a landfill and has extracted soluble dissolved or suspended materials in the process.

Leachate

II. EFFECT OF MSW ON ENVIRONMENTAL COMPONENTS

Solid waste disposal in landfills remains the most economic form of disposal in the vast majority of cases. Therefore; landfills will continue to be the most attractive disposal route for solid waste. Indeed, depending on location, up to 95% of solid waste generated worldwide is currently disposed of in landfills. Resorting to landfills is not limited to the disposal of municipal solid waste, but it includes most other industrial wastes. For instance, nearly 70% of hazardous wastes generated in the India are dumped in landfills. Therefore it exert very large burden on environment.

Following are the effect of MSW landfill on environment:

(a) Effect on Water

Rain water in the rainy season reacts with MSW and percolate it from dumping ground reaches ground water table pollutes the ground water. The study has revealed that the ground water quality does not conform to the drinking water quality standards as per Bureau of Indian Standards.

The effects of dumping activity on ground water appeared most clearly as high concentrations of total dissolved solids, electrical conductivity, total hardness, chlorides, chemical oxygen demand, nitrates and sulphates. The study clearly indicates that landfills in densely populated cities should have the groundwater monitored on regular basis. Furthermore, ground water in and around the landfill sites shall not be used for drinking purposes unless it meets specific standards. Indiscriminate dumping of wastes in developed areas without proper solid waste management practices should be stopped.

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(b) Effect on Land

When these MSW are deposited or dumped on dumping yard cause land pollution, because it will decrease fertility of land. MSW when dumped on ground it will react with soil and alters its properties. MSW affects the permeability, porosity, density, consistency limit like plastic limit, liquid limit etc. As large area cover by the dumping ground and landfill hence pollution scale will be large.

(c) Effect on Air

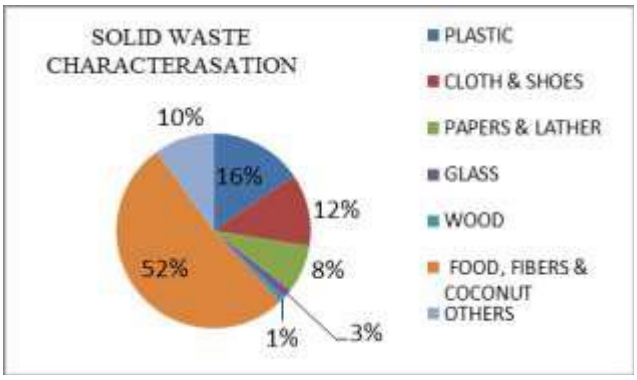
MSW on dumping ground also pollute the air because of generating various toxic or non-toxic gases in the surrounding air which will cause unhygienic environment human. These gases contain CO_2, NO_2, SO_2, Methane etc. which having very bad odour.

III. EXPERIMENTAL WORK

A] Study Area

Pandavleni land filling dumpsite is located at latitude 20°01′N 73°30′E and longitude 20.02°N 73.50°E located at an altitude 561m above mean sea level. The Pandavleni land filling dumpsite is on NH - 3. Pandavleni Land filling dumpsite is surrounded by residential areas in which they are heavily affected by both soil and water pollution through the leach out of hazards from the solid waste. The water samples will be collected from the nearer to the solid waste dumpsite.

Solid waste is characterized as shown in figure, which shows the actual scenario of municipal solid waste (MSW) and its characteristics.



B] Sampling

The preliminary survey of ground water quality & solid waste samples was conducted in the month of Dec. 2016.Because the ground water gets polluted due to solid waste dumping near to the location.

C] Ground Water Samples

The ground water were collected in the month of Jan. 2017.The sample collection preservation & analysis were done as per standard methods. The water samples were collected from the wells & bore wells near to the location of dumping site.The polyethylene sample containers were used for the sampling. The containers are cleaned by nitric acid & left it for two days followed by through rinsing of distilled water.Two litters of each sample were collected for the analysis. The preservation techniques are followed for the preservation of samples

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as per Indian Standard Method. pH of samples, Total suspended solids, Total dissolved solids and Total solids were analyzed as soon as possible.

D] Leachate Samples

Two litters of leachate samples were collected for the analysis. The leachate was collected from the gutter provided around the landfill.Standard procedure was followed for collection of the leachate sample.

IV. RESULT AND DISCUSSION

To investigate the effect of municipal solid waste land fill on ground water environment, we collected one leachate and ten ground water samples from the surrounding area of Pandavleniland fill site of Nashik.Till now the leachate sample and five ground water samples were analyzed.

After the laboratory testing of samples we got following results.

Sr. No.	Sample Parameters	Leachate	Ground water 1	Ground water 2	Ground water 3	Ground water 4
1	pH	6.14	7.73	7.70	7.15	8.20
2	TS (mg/lit)	453	870	750	580	4000
3	TDS (mg/lit)	520	568	330	115	1540
4	TSS (mg/lit)	654	302	375	465	1170
5	EC (µS/cm)	53500	39446	25346	34684	41658
6	TH (mg/lit)	2260.25	1722.3	1568.28	944.2	1253.25
7	BOD (mg/lit)	6724	1254	1036	1448	4586
8	COD (mg/lit)	11645	2720	2125	3356	7542
9	K (mg/lit)	44.28	2.31	2.12	2.15	1.49

V. CONCLUSION

After the analysis of various ground water samples we come to know that the leachate collected from Nashik MSW dumping site shows high values for the analyzed physio-chemical characteristic. The ground water samples are also exceeding the minimum values set by the Indian Standard

The ground water contamination is accelerated by the erratic rainfall pattern, high permeability of local black cotton soil, infiltration and fracturing in local region rocks. There is no other artificial or natural source of pollution, so it can be concluded that the leachate and solid waste has high impact on ground water quality. Large portion is covered by agricultural land near by the landfill site. The ground water contamination reducing productivity of agricultural land. So there is need of proper solid waste disposal system to reduce the percolation of leachate through the sub soil to reduce ground water contamination. Suitable lining should be provided for the same purpose.

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REFERENCES

[1] N. Raman And D. Sathiya Narayanan "Impact Of Solid Waste Effect On Ground Water And Soil Quality Nearer To PallavaramSolid Waste Landfill Site In Chennai" (Vol.1, No. 4 - 2008)

[2] Pradeep T. Kumawat&U. P. Naik"Investigation The Impact Of Municipal Solid Waste On Sub Surface Environment" (IJSRDVol. 3, Issue – 05, 2015)

[3] Gawsia John, Harendra K. Sharma &VikasVatsa"Impact Of Municipal Solid Waste Dump On Ground Water Quality At DandaLokhandLandfill Site In Dehradun City, India" (IJES Vol. 5, No. 3 - 2014)

[4] G. VenkataRamaiah, S. Krishnaiah, Maya Naik&Shankara"Leachate Characterization And Assessment Of Ground Water Pollution Near MSW Dumpsite Of Mavallipura, Bangalore" (IJERA Vol. 4, Issue 1 (Version 2) – Jan, 2014)

[5] Salami L., Fadayini M. O. &Madu C. "Assessment Of A Closed Dumpsite And Its Impact On Surface And Groundwater Integrity: A Case Of OkeAfaDumpsite, Lagos, Nigeria" (IJRRASVol. 18, Issue 3 – March 2014)

[6] Mohammed Saidu"Effect Of Refuse Dumps On Ground Water Quality" (Advances In Applied Science Research, Vol. 2 - 2011)

[7] N. Rajkumar, T. Subramani&L. Elango"Groundwater Contamination Due To Municipal Solid Waste Disposal – A GIS Based Study In Erode City" (IJES Vol. 1, No. 1 – 2010)

[8] Pervez AlamAnd KafeelAhmade, Impact Of Solid Waste On Health And The Environment,Special Issue Of International Journal Of Sustainable Development And Green Economics (IJSDGE, ISSN No.: 2315-4721, V-2, I-1, 2, 2013)

[9] NitinKambojAnd MohranaChoudhary, Impact Of Solid Waste Disposal On Ground Water Quality Near GazipurDumping Site, Delhi, India. (Journal Of Applied And Natural Science 5 (2): 306-312, 2013)

[10] Dr. Sohail Ayub1 And YaserSaleemSiddiqui,Municipal Solid Waste Dumping Practice And It Impact Assessment (European International Journal Of Science And Technology Vol. 4 No. 3 March, 2015)