International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

STUDY OF THE IMPACT OF MUNICIPAL SOLID WASTE ON SOIL NEAR TO RIVER BHIMA: IN CASE OF LANDFILL AT RAJGURUNAGAR

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Abstract - Discharging of untreated municipal solid wastes (MSWs) onto land is very widespread in developing countries. The compounds contained in MSW cause a harmful effect to human and environment. Hence, an assessment of the extent of their local impact is of great interest to figure out the pollution they cause. Therefore, this study aimed at evaluating the effects of discharge of solid wastes on soil quality within the landfill of khed. To achieve this, different soil physicochemical parameters were considered: pH, organic matter content, and heavy metal concentration. The results indicated the influence of the MSW on the physicochemical characteristics of the soil by enhancing the organic matter content of soil and increasing heavy metal content (Cu, Zn, Cd, Pb, Ni, and Cr), which is a clear indication of the level of pollution they are generating.

Key Words: Physical characterization, Soil pollution, Open dumping, Waste disposal sites, Soil quality.

1. INTRODUCTION

The municipal solid wastes (MSWs) are undesirable materials mainly consisting of household wastes and so are called household garbage. They also include similar waste to MSW which refers to wastes of the industrial companies, crafts, trades, hotels, schools, public services, and hospitals and municipal services such as road wastes, parks and gardens maintenance, and other recreational areas that present physicochemical features or equivalent to toxicity of household garbage. The exponential growth of the world population, the urbanization, the socioeconomic development, and the improvement of living standards have trained phenomenal augmentation of the municipal solid wastes production in the whole world. The landfill is still worldwide and very common. It has been the principal method of the municipal solid wastes' elimination in the recent decades because it is the simplest practice and the most economical of this type of wastes' storage in a lot of countries, particularly in the developing countries. They also present nuisance and considerable environmental impacts by the production of both leachate and biogas. The leachate conveys an important pollution load essentially formed of heavy metals, organic matter, and important community of pathogenic bacteria: by leaching and infiltration through the ground, it begets an organic, bacteriological, and heavy metal pollution of soils, surface water, and ground water.

The Bhima River originates at Bhimashankar near Karjat on the western side of the Western Ghats at an altitude of 945 m above sea level. Bhima River flows in the southeast direction for 745 kilo+ meters covering the states of Maharashtra, Karnataka and Telangana. In Maharashtra Bhima River drains an area of 48,853 km2 and has a length of 451 km. Originating at Bhimashankar in Ambegaon Taluka of Pune district it flows southeast for 861 kilometres through Maharashtra, Karnataka, and Telangana states, before confluence with the Krishna River at Kadlur (Raichur) in Karnataka. In Maharashtra the river flows a length of 450 km.

2. LITERATURE REVIEW

1. This paper shows the physico-chemical and biological parameter features of this river fluctuate from place of place due to discharge of agricultural, municipal as well as industrial wastes on bank side of river. Changes took place in water use, land use, and hydrological conditions due to abstractive uses of water, growth of urban population, growth in industrialization, increase in agriculture activities, increase in use of chemicals in agriculture; and increase in use of chemicals at household level.
2. This paper gives information about leachate. Leachates have been implicated in environmental pollution, developmental anomalies, birth defects, and surface and groundwater pollution worldwide.
3. The knowledge of the quantity and composition of leachates usually gives an insight into appropriate, effective and sustainable treatment approach.
4. This paper shows environmental pollution caused by the landfill leachate has been one of the typical dilemmas of landfilling method. Leachate is the liquid produced when water percolates through solid waste and contains dissolved or suspended

materials from various disposed materials and bio decomposition processes. It is often a high strength wastewater with extreme pH, chemical oxygen demand (COD), biochemical oxygen demand (BOD), inorganic salts and toxicity.

3. METHODOLOGY

3.1. Data collection and problem detection

The study was conducted on the bank of Bhima River, in khed, Pune. The site is located at starting point of khed. Which increases constantly due to the regular input of waste. Approximately 15 ton/d wet and dry solid waste collect from khed city. When rainfall occurs, rain comes in contact with solid waste and forms leachate which finds its way to percolate into aquifers and soil strata.

Fig.1. Showing landfill site at bank of Bhima River before site excavation

Fig.2. Showing landfill site at bank of Bhīma River after site excavation

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3.2. Collection of soil samples

One open dumpsite was selected on bank of river at Rajgurunagar. The soil samples were collected within the dumping ground and from the periphery of dumpsites in the selected regions. Each dumpsite consists of mix waste including municipal, institutional, residential, industrial, and commercial waste. The depth and approximate area of the dumpsites were 2.5–3 m and 15–30m^2, respectively. Sample collections were carried out in the months of April and May prior to rainy season so that the measured parameters were not affected by the rainwater.

Soil samples taken from six trial pits of dumpsite in the study regions at depths of 0.5 m, 1 m and 1.5 m were used for investigation. Three of the soil samples were collected at the Center and corners of the dumpsites in low-lying area.

4. LIMITATION

The direct disposal of the solid waste into the bank of water bodies create the burden for survival of the aquatic life and disturb the natural purification process. The floating debris

and waste will reduce the rate of eutrophication of the water bodies. This study give the highlighting on the issues related to the disposal of Solid waste near to water bodies. The main environmental problem associated with the disposal sites is the potential risk posed to the soil. Rising concerns over MSW's have revealed several risk associated with their soil and release into the environment. While exact mechanisms are not fully understood, toxicity seems related to uptake and effect to environment.

5. FIELD ANALYSIS

Sampling is the most critical step in the collection of the spacial distribution data of soil properties. In this study, the random-stratified sampling method was applied because the landfill soil is rough, which generates a variability in the deposition of waste along the landfill. In this type of sampling, samples are collected in random-chosen places in a homogenous area.

6. CONCLUSIONS

Landfill is one of the source of water pollution. Landfill is the most economical way of disposing waste, but due to our engineered nature, it poses a great risk to human health and environment. The highly contaminated wastewater that is formed in the landfill when waste is subjected to physicochemical and biological transformation. The percolation of rainwater through landfill and inherent water present in waste lead to the formation of leachate. The pollution potential of leachate depends upon various factors such as the leachate concentration, landfill location, i.e., hydrogeological setting, landfill type, and the quality and volume of the receiving water.

7. ACKNOWLEGMENT

This work would not have been possible without the contribution of many. Firstly, I would like to thank guide and Principal Dr.Sunil B. Thakare for his support and guidance, also thankful to Prof. S. M. Gawande for valuable inputs during analyzing soil parameter.

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