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Effect of Pirana dumping site on Hydrology of Ahmedabad

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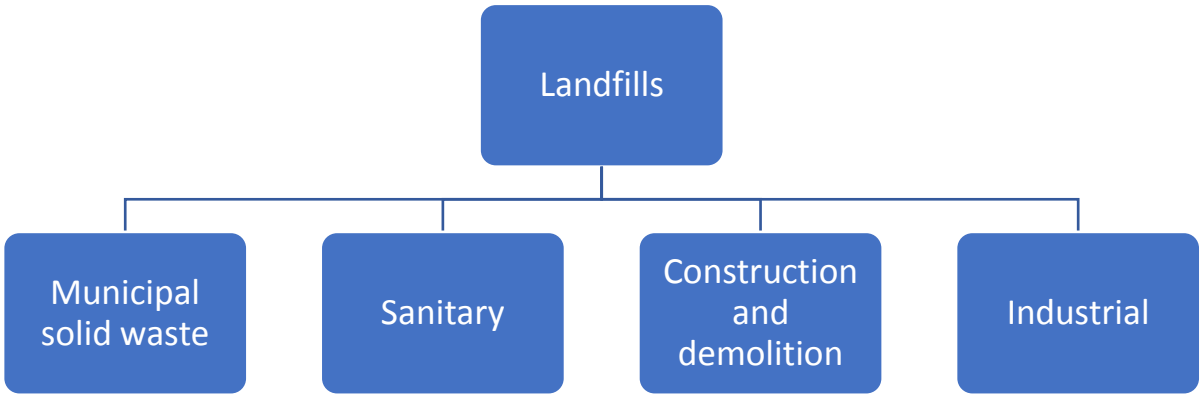
Abstract: Ahmedabad, Gujarat State is the 7th largest metropolis of India having a population of 60 lakhs and spread over an area of 466 sq. km and generating 3500 metric tons of solid waste on daily basis. This metropolitan city has two field dump sites, at Pirana it has been operated since 1980. The management and right direction disposal of the accumulated domestic solid waste is a crucial challenging task for the municipal and state government authorities. The effect of dumpsite on hydrology were assessed. Dumpsite leachate and groundwater samples were obtained and analysed for the following parameters.PH, Total Dissolved solids (TDS), CA, CL, Mg. The concentration of the analysed parameters for the dumpsite leachate could contaminate groundwater. The characteristics of leachate & its probable risks on groundwater pollution were investigated following the analysis of some chemical parameters of the leachate generated in the Pirana dumpsite, Ahmedabad, India. five samples of the groundwater were collected from the different locations around the Pirana dumpsite. The laboratory test results on groundwater samples show high concentration of TDS (1200 mg/lit), Calcium (75 mg/litre), PH (6.6-8.5), MG (30mg/litre), CL(250mg/litre) and have very high potential for contaminating ground. The data collected from the Ahmedabad Municipal Corporation shows high concentrations of TDS (2272 mg/litre), Chlorides (818 mg/lit).The surface water samples around the landfill site appear to be contaminated, most probably, the overflow of leachate. Groundwater parameters do not satisfy drinking water quality standard so it's harmful if consummated without proper treatment. Biological treatment through Reverse Osmosis improves the quality of groundwater significantly. The water should be used for drinking or cooking but only after it is purification through RO system as it removes almost 95 % of the dissolved solids.

1. Introduction

Land filling of municipal solid waste is a common waste management practice and one of the cheapest methods for organized waste management in many parts of the world. (El-Fadel et al., 1997; Dsakalopoulous et al., 1998, Jhamnani et al., 2009). In most low to medium income developing nations, almost 100 percent of MSW generated goes to landfills. This waste materials results in to contamination of soil, ground water and underground water as leachate produced by water or liquid water moving into through and out of landfill, migrates into adjacent areas. The adverse impacts of landfill leachates on adjacent surface and groundwater have prompted a great number of studies since 1980. The qualitative and quantitative characteristics of leachates are very important in the design and management of landfills. (Tejero et al. 1993)



The storage of any waste material in a landfill poses potential problems. One problem is the possible contamination of soil, groundwater and surface water that may occur as leachate produced by water or liquid

wastes moving into, through and out of the landfill, migrates into adjacent areas. This problem is important especially when industrial wastes are involved because many of these substances are resistant to biological or chemical degradation and, thus, are expected to persist in their original form for many years, perhaps even for centuries.(A STUDY ON THE LANDFILL LEACHATE AND ITS IMPACT ON THE GROUNDWATER QUALITY OF THE GREATER AREA) The storage of any waste material in a landfill poses potential problems. One problem is the possible contamination of soil, groundwater and surface water that may occur as leachate produced by water or liquid wastes moving into, through and out of the landfill, migrates into adjacent areas. This problem is important especially when industrial wastes are involved because many of these substances are resistant to biological or chemical degradation and, thus, are expected to persist in their original form for many years, perhaps even for centuries. Ahmedabad is first heritage city of India as well as also considered as one mega city of India. Total population of city is 60 Lacks and its generating 3500 Mt CO_2 daily. Pirana landfill site is in operation since 1980.

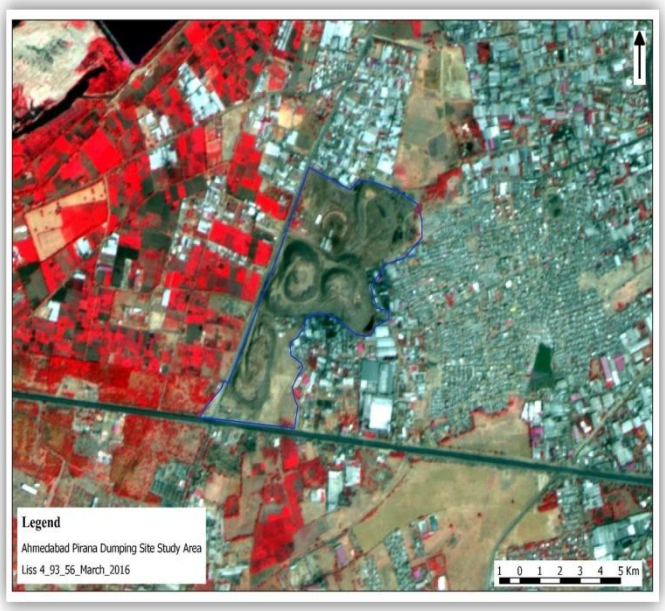
2. Research objectives

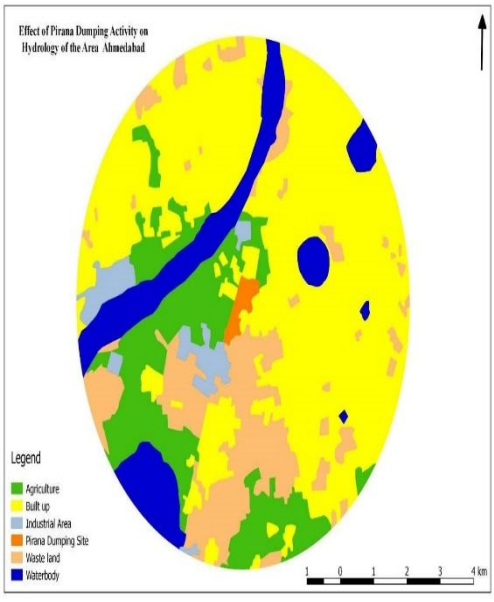
- To study environmental condition of the Pirana dumping site with the help of remote sensing and GIS.
- To evaluate the surface and subsurface condition of the water to assess the chemical properties of the area.
- To identify the need and the extent of, remedial/ mitigation measures to reduce effects on surrounding environment.

3. Methodology

For identification and map the dump site we used remote sensing technology. Area of interest built on IRS LISS-IV image path/Row 93/56. With the help of random sampling method phesico-chemical parameters were also examined of various water bodies in Ahmedabad city. Four areas of Ahmedabad included in water analysis and from analytical method we analysed water samples.

4. Results and discussion





Area of interest was generated during mapping of pirana landfill site in Ahmedabad. It is extended in 466 Sq. Km area and daily daily 3500 Mt waste material is dump in this landfill sight. Depth to groundwater map was interpolated using the inverse distance weighting (IDW)method in ArcGIS. GIS maps on spatial and temporal variations in the study area were generated IDW method in ArcGIS.

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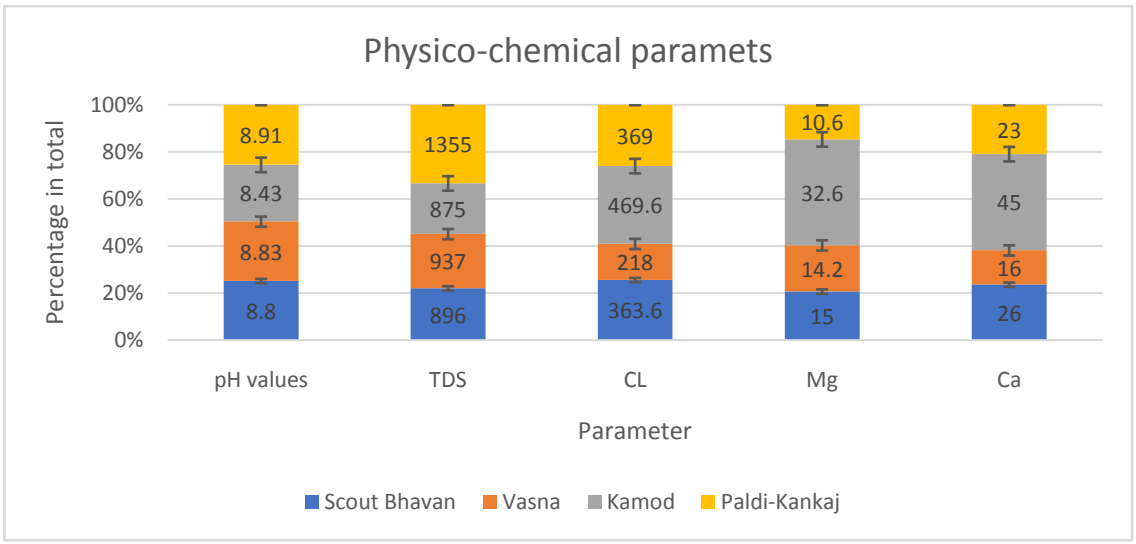
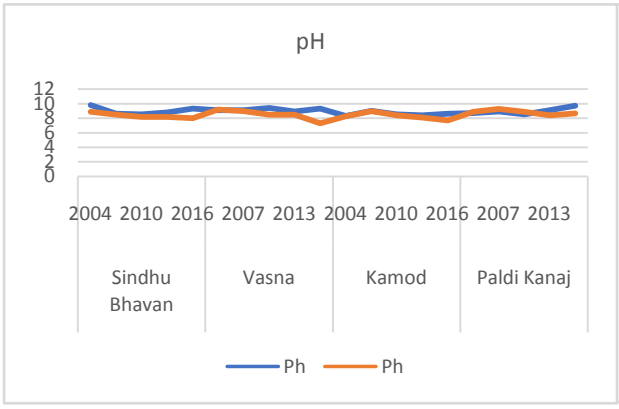
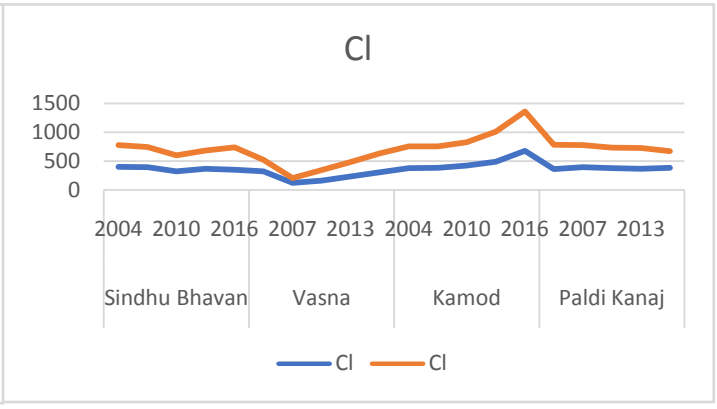
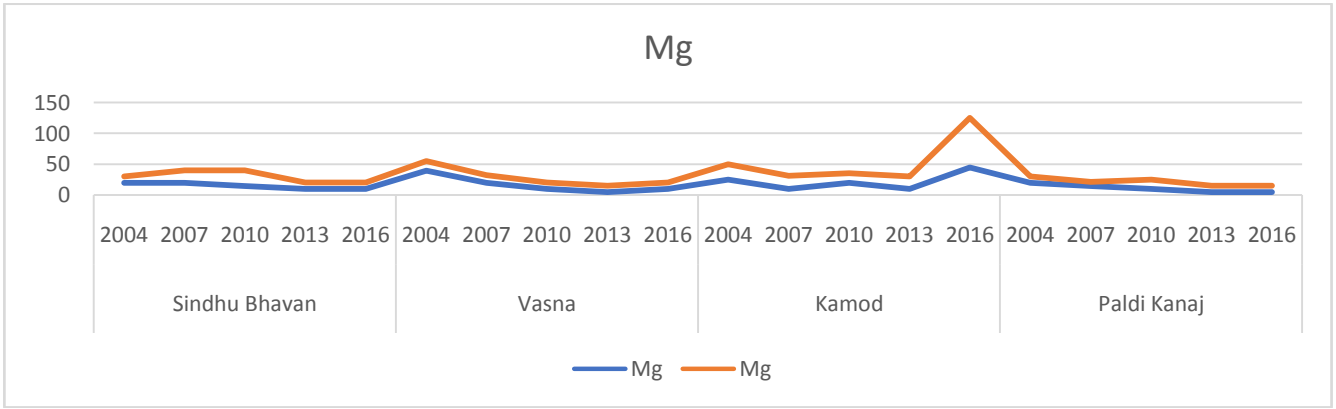


We selected four various regions of Ahmedabad and analysed 5 elements in to the sample water bodies. Minimum Ph was observed in Kamod at the same time maximum Ph was observed in Paldi area of Ahmedabad. TDS, Cl, Mg and Ca is very high in Kamod area.







Physico-chemical analysis gave the following results:

- Kamod is showing minimum pH amongst all selected areas. Minimum Ph was observed in October 2013 and maximum pH was observed in May 2014 in Sindhu Bhavan.

- Waterbodies of Kamod are identified with maximum chlorine content (680 ppm) during October 2016 and minimum chlorine content is identified in Vasna (84 ppm) in October 2007.
- Kamod is showing maximum Mg (80 ppm) content in October 2016 and minimum content was observed in Paldi during May 2013 and 2016.

Conclusion:

Analysis of IRS LISS III image shows increase in build up area around Pirana dump site in past 16 years. This build up areas and activities reduced the agricultural activity in the area. This dumping site is affecting surrounding waterbodies and increasing pollution in given area. The values of CL (1000mg/l), MG (100mg/l), CA (200mg/l), PH (6.5-8.5), TDS (300), are ingeneral above permissible limit. permissible limits for CL (524mg/l), MG (48mg/l), CA (23), PH (9.8), TDS (1355mg/l) Different type's material is being dumped at this site which may have various hazardous chemicals in addition to above chemical parameters. Therefore, detail chemical study of the dumping site material, soil as well as surface and groundwater are required to assess the exact environmental effect.

References

[1]. El-Fadel, M., Findikakis, A. N., & Leckie, J. O. (1997). Environmental impacts of solid waste landfilling. *Journal of environmental management*, *50*(1), 1-25.2. Joshi, R. (2014). *Mobility practices of the urban poor in Ahmedabad (India)* (Doctoral dissertation, University of the West of England).

[2]. Daskalopoulos, E., Badr, O., & Probert, S. D. (1998). Municipal solid waste: a prediction methodology for the generation rate and composition in the European Union countries and the United States of America. *Resources, conservation and recycling*, *24*(2), 155-166.

[3]. Jhamnani, B., & Singh, S. K. (2009). Groundwater contamination due to Bhalaswa landfill site in New Delhi. *Int J Environ Sci Eng*, *1*(3), 121-125.

[4]. Dondoni, A., Franco, S., Merchán, F. L., Merino, P., & Tejero, T. (1993). Stereo control by diethylaluminum chloride in the addition of 2-lithiofuran and N-methyl-2-lithioimidazole to α-alkoxy nitrones. Total synthesis of 5-O-carbamoylpolyoxamic acid. *Tetrahedron letters*, *34*(34), 5479-5482.