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Hazardous waste pollution generated by industrial units in Bahadurgarh city (Haryana)

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Abstract

The environmental pollution caused by industrial hazardous wastes are rapidly increasing in tune with rapid rate of industrial growth and urbanization. The problem of disposal of ever-increasing quantities of hazardous substances have become a headache for not only industrialized and developed countries but also for most of the developing countries. The present analysis reveals that the hazardous waste generated by industrial units in Bahadurgarh city are the major contributors to the environmental degradation, which pollute severe land, water and air in and around the city.

Keywords: Industrialization, environmental pollution, industrial effluents, hazardous waste, alkaline and metalliferous sludges, etc.

Introduction

A hazardous substance is a material that may pose a danger to living organisms, materials, structures, or the environment by explosion or fire hazards, corrosion, toxicity to organisms, or other detrimental effects. These discarded hazardous substances after their uses are variously called as refuse, garbage, rubbish, hazardous waste etc. These hazardous wastes require proper and ample space for their dumping and disposal. Population growth, increasing urbanization, industrialization, and rising standards of living have all contributed to an increase in both the amount and variety of waste generated in most countries. Industrial process wastes encompass a very wide range of materials and may include general factory rubbish, packaging materials, organic wastes, acids, alkaline and metalliferous sludges. The most important feature of industrial waste is that a significant proportion of this waste is regarded as hazardous and which requires special treatment and disposal. It is generally accepted that the bulk of hazardous and toxic wastes are generated by industrial process, the main sources being the chemical sector, mineral and metal processing industries and the engineering industries. Hazardous wastes arise not only as the by-products of industrial processes, but also include huge number of abandoned items when consumers discard empty chemical packaging and other items at the end of their useful life.

Study Area

Bahadurgarh city is an important industrial center of Jhajjar district of Haryana state where 1, 70, 426 people inhabited in 31 municipal wards spread over an area of about 29.65 square kilometres (2011). The city lies between $28^{\circ}41' N$ to $28^{\circ}68' N$ latitudes and $76^{\circ}55' E$ to $76^{\circ}92' E$ longitudes (Fig. 1). It is located at distance of 45 kilometers from Rohtak, 35 kilometers from Jhajjar, situated 28 kilometers west of Delhi on the Delhi-Rohtak NH-10.

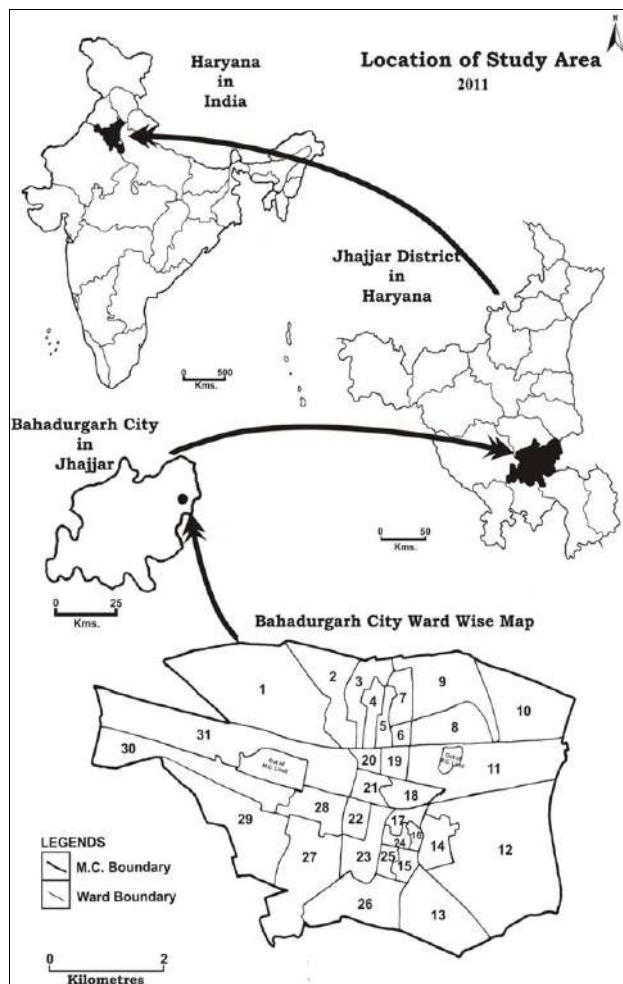
Objectives

The objectives of this study are to examine the level of hazardous waste pollutants generated by industrial units in Bahadurgarh city and to suggest an action plan for the proper and environmentally friendly disposal of this industries generating hazardous waste pollution.

Data and Methodology

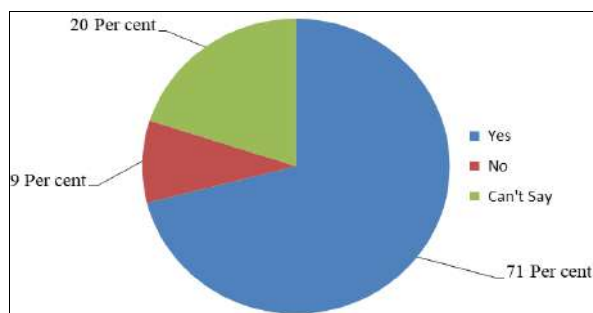
This study is based on the secondary and primary sources. The secondary data has been collected from various departments of Government agencies and published, unpublished literatures. The primary data collected through field survey and well-structured questionnaire survey. Purposive stratified sampling technique is used to select samples for which 100 households have been selected.

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Hazardous Waste in Bahadurgarh city

The industrial units generate lots of hazardous waste in Bahadurgarh city, which is being dumped in low lying vacant lands adjacent to the industrial areas. Industries not only pollute land through dumping of hazardous wastes in open areas that are leached in to the soil but it also pollutes the ground water. These hazardous wastes dumping is increasing danger of ground and surface water contamination. Hazardous waste samples from surface and various depths of these dumped wastes sites have been found to contain high levels of fecal coli forms and fecal streptococci. In primary survey, the majority of respondents, 71 per cent responded that hazardous waste generated by industrial units is leading to environmental pollution in Bahadurgarh city, 9 per cent respondents said that hazardous waste has no impact on environment pollution and 20 per cent respondents were unaware about this (Figure 2).



Source: Primary Survey, 2011

Fig 2: Hazardous waste and environmental degradation in Bahadurgarh city

The locality-wise primary survey reveals that majority of respondents in Kabir Basti and Chottu Ram Nagar, 80.0 per cent and 90.0 per cent respondents said hazardous waste is responsible for environmental degradation in their localities, only 3.3 per cent and 6.7 per cent respondents responded no and 16.7 per cent and 3.3 per cent respondents were unaware about the impact of hazardous wastes on environment respectively. While in Vivekanand Nagar 46.7 per cent respondents said hazardous waste generated by industrial units is deteriorating city's environment, 16.7 per cent respondents said no and 36.6 per cent respondents were unaware about this impact (Table 2).

Table 1: Hazardous waste and environmental degradation in sample areas

Environmental Degradation by Hazardous Waste	Response in Per cent		
	Name of Localities		
	Kabir Basti	Chottu Ram Nagar	Vivekanand Nagar
Yes	80.0	90.0	46.7
No	3.3	6.7	16.7
Can't say	16.7	3.3	36.6

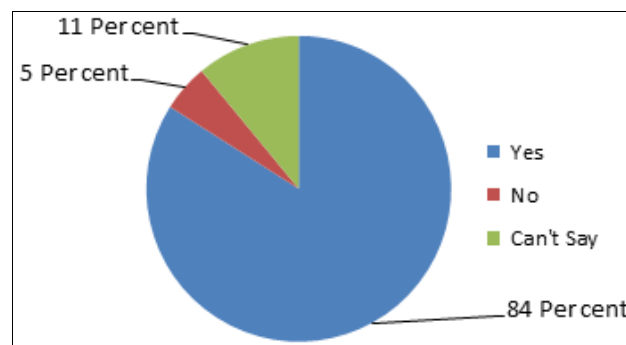
Source: Primary Survey, 2010

Thus, the environment of Kabir Basti and Chottu Ram Nagar localities are more degraded by hazardous waste in comparison to Vivekanand Nagar locality, as these localities are located in low-lying outer areas of the city, which are located adjacent to industrial areas, railway line and many industrial units dispose their hazardous waste at vacant land of these localities. In Bahadurgarh city, the Haryana State Pollution Control Board identifies the hazardous waste generating industries in industrial areas. There are 60 industrial units are identified as potential hazardous waste generating units based on source of generation i.e. (i) types of raw materials used, (ii) products manufactured and (iii) hazardous wastes generated. The industrial units in Bahadurgarh city generated 512 MT/Annum hazardous waste in 1998, which is an increase of 1,072 MT/Annum in 2004 and 1,522 MT/Annum in 2010 (Table 3).

Table 2: Hazardous Waste in Bahadurgarh City, 2010

Years	Hazardous Waste Generated (MT/Annum)
1998	512
2004	1072
2010	1522

Source: Haryana State Pollution Control Board, Bahadurgarh, 2010.



Source: Primary Survey, 2011

Fig 3: Increase stock of hazardous waste in Bahadurgarh city

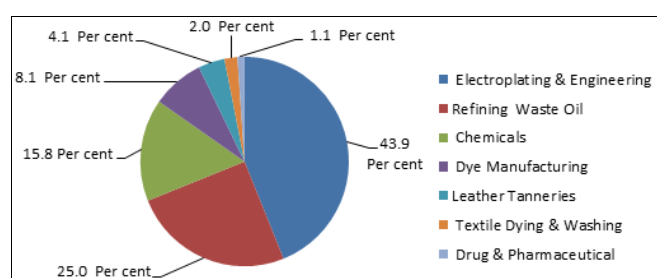
Thus, the stock of hazardous waste in Bahadurgarh city is increasing at dangerous rate. In primary survey, the majority of respondents, 84 per cent respondents said that the stock of hazardous waste generated by industrial units in Bahadurgarh city is increasing day by day, while only 5 per cent respondents responded that it is not increased and 11 per cent respondents were unaware about this (Figure 3).

Table 3: Hazardous waste generating units in Bahadurgarh City, 2010

Industrial Sector	Industrial Units		Industrial Hazardous Waste Generated	
	Total No.	In per cent	MT/Annum	In per cent
Electroplating & Engineering	21	35	669	43.9
Chemicals	15	25	240	15.8
Textile dying and Washing	09	15	30	2.0
Leather Tanneries	07	11.7	62	4.1
Refining of Waste Oil	04	6.6	381	25.0
Dye and Dye Intermediates	03	5	124	8.1
Drug and Pharmaceutical	01	1.7	16	1.1
Total	60	100.0	1522	100.0

Source: Haryana State Pollution Control Board, Bahadurgarh, 2010.

Table 4 shows that the main industrial sectors, which generated hazardous wastes, are electroplating and engineering consisting 35 per cent of total hazardous waste generating units followed by chemicals manufactured units (25 per cent). The other sectors generating hazardous wastes are textile dying and washing (15 per cent), leather tanneries (11.7 per cent), refining of waste oil (6.6 per cent), and dye and dye intermediates (5 per cent), drug and pharmaceutical (1.7 per cent). It varies from one industrial sector to other, for example, the maximum quantity of hazardous waste generated from electro plating and engineering units (43.9 per cent) followed by refining of waste oil (25 per cent); dye and dye intermediates (8.1 per cent); chemicals (15.8 per cent); drugs and pharmaceuticals (1.1 per cent); leather tanneries (4.1 per cent) and textile dying and washing (2 per cent) (Figure 4).



Source: Haryana State Pollution Control Board, Bahadurgarh, 2010.

Fig 4: Hazardous waste generating units in Bahadurgarh city, 2010

There is no designated hazardous waste disposal site in Bahadurgarh City. These industries disposed of either inside their premises which has already been overfills or outside in low-lying vacant areas. In primary survey, 66 per cent respondents revealed that hazardous waste generating units dispose their waste at vacant plots located inside the industrial areas, 20 per cent respondents said that it is disposed in low-lying areas of the city, 6 per cent respondents said they dispose waste inside their premises, while only 3 per cent respondents told that waste is disposed at designated sites and 5 per cent respondents that they didn't know where these industries dispose hazardous waste (Table 5).

The sector wise distribution of industries shows that there are various types of industrial units, which generate hazardous wastes in Bahadurgarh city during 2010. These 60 industrial units generated 1,522 MT/year hazardous wastes in Bahadurgarh city in 2010 (Table 4).

Table 4: Site of Hazardous Waste Dispose in Bahadurgarh City, 2011

Hazardous Waste Dispose Sites	Response in Per cent
Vacant plots inside industrial areas	66
Low-lying areas of city	20
Inside their premises	6
At designated sites	3
Can't say	5

Source: Primary Survey, 2011.

Concluding Remarks

Bahadurgarh city has emerged as a main industrial hub in Haryana. It was mainly because of its proximity and well connection to national capital territory of Delhi and other NCR areas. Now a day Bahadurgarh city has been selected by more and more entrepreneurs for establishing industries. However, this industrial development has contributed to the environmental pollution related problems in the city. There are many industrial units in the city, which generate hazardous waste. The stock of this hazardous waste has been increased by three times from 1998 to 2010 and has no designated site for dumping; hence it is dumped in vacant plots nearby the industrial areas, which pollutes the soil and contaminates land, surface and ground water. More than 70 per cent respondents perceived that hazardous waste generated by industries is responsible for declining environmental quality. Thus, there is an urgent need for solving industrial pollution problems by adopting a balance approach between industrial development and environmental management in Bahadurgarh city.

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