Study of Solid Waste Deposited At Different Sites of the Embankment of the River Ganga at Patna

Udesh Paswan[1]* Dr. Akhilesh Kumar[2]

[1] Department of Zoology, A. N. College Patna, Magadh University

[2] Assistant Professor of Zoology, A. N. College Patna, Magadh University

Abstract – Large cities centered on the large river are often found that many of the slums are constructed close to the shore, owing to low land costs and the flooding of river waters during the rainy season. Due to the financial and physical features of the urban slums, the public waste management scheme is seldom encouraged. The waste collection method also struggles because of the tightly constructed houses and narrow roads and because of analphabetism that does not dump waste at the municipality's waste bin or designated location. The volume of solid waste disposed of at the precise point chosen by the town, as well as the waste deposited on the ground or side of the ground, of which the Environmentalist is obliged, and how this waste pollutes water. The volume of solid waste not adequately dumped is determined by comparing the overall solid household waste and the sum of waste received by the municipality. The water quality measurement metric involves pH, turbidity, BOD, COD, electrical conductivity, TDS and TS. They demonstrate why and how to enhance the water quality of the river and the ecosystem of the municipality.

Key Words – Solid Waste, River Ganga, Disposal

---------------------------♦----------------------------

INTRODUCTION

Waste disposal is still a huge problem for the town. This solid urban waste is not valuable, but is growing every day (Olanrewaju & Ilemobade, 2009)[1]. When the town comprises different groups of citizens, solid waste management becomes more difficult. Different groups of individuals have varying waste collection methods which get serious if both groups do not have the same waste collection facilities. A general picture of poverty is the term slum. Because of insecurity, slum residents seldom get SWM facilities. The dilemma for SWM is not only exacerbated by violence but also by the spatial state of slums. In spite of environmental development, several developing countries do not dispose of their waste (Gabriel and Olusegun, 2011)[2]. Many slums in our country are on the banks of the river because the price of the land is poor. In addition, slums are too heavily inhabited to be penetrated by the urban waste management. As people reside near the shores of the river, they use the river as much as possible. While certain citizens use waste for disposal, the rate of disposal is not sufficient. Any of them would presumably be disposed of in the flow. As water is polluted with different metals and chemicals, it affects the consistency of the water parameters of the river including pH, EC, DO etc. (Islam, et al. 2010)[3]. The goal of this research is to analyse the latest SWM studies in the slum region and their impact on river water quality.

CONCEPT OF WASTE DISPOSAL

With respect to the overarching definition, "disposal" involves bringing waste into the deposition for final burial, degradation or regeneration purposes. As a terminal step for the management of solid waste contamination, the final goal of disposal is to insulate solid waste and its effect on the atmosphere from biosphere and to prevent inacceptable risks from the infection of dangerous substances in waste by man and the ecosystem. The aim of final disposal is to avoid further processing and usage of the waste.

Recovery is also part of the final disposal. For example, waste from some industrial processes may become a desirable raw material for another industrial process. Improving manufacturing technology will enable historical waste to be reused. In reality, permanent isolation is the most important final disposal technology, like waste management, land treatment and sea treatment, via numerous natural and/or artificial barriers to insulating toxic waste from the biosphere.

With a comprehensive description, "disposition" implies the activities of reducing the amount of solid waste generated, of reducing and even of removing hazardous waste elements, of containing solid waste in a facility that meets environmental protection requirements without isolating from the biological setting. In order to satisfy the disposal criteria, certain procedures that change the physical, chemical or biological properties of solid waste, such as manure, incineration and/or other waste, should be added.

Public involvement in coping with urban MSWM is quite significant. Often the challenge of environmental officials in preparing and managing a project in a social way overlooks the need to find technological solutions to MSWM problems, especially waste disposal of significant environmental quality. In other examples, MSWM judgments are likely to be taken without proper preparation, to be focused purely on certain elements of a scenario or to be motivated by the desires of legislators. Overcoming those patterns would make it very convenient in the specified circumstances to find the right approach.

The whole phase from waste minimization to final disposal includes multiple decision makers in natural, economic and social fields on how to determine a technological approach. Many waste management responses have wider consequences. This implies that a solution or strategy must be an effective, safe, environmentally friendly and socially responsible combination of concerns affecting MSWM problems. To make the correct option, it is very necessary not only to provide a clear or basic target in MSWM but also to take account of the unique demands of an area where a suggested approach is to be introduced. The variety of factors which help to decide what is acceptable in a situation is broad enough to measure any suggested scheme against the realities of a certain scenario.

In some conditions, incremental expenditure in environmental enhancement sometimes contributes to limiting people's behavior. In developed nations, this is much more apparent. In these countries' governments can not only work on avoiding air emissions and/or threats for human beings, but also make spending the highest return on civilization. We must strike a compromise between environmental benefits, social benefits and economic benefits. In every region, waste management expenditures must play a major role in integrated development of the ecosystem. Socializing waste management will be unavoidable eventually.

The basic principles of various urban waste treatment technologies and a quick overview are defined in this chapter. This agreement aims at promoting the sharing of knowledge and ideas between regions and a single discussion of a variety of related problems in various parts of the world. Since there are countless variations, from one position to another in terms of choices, these discrepancies cannot be overlooked, yet we are attempting to draw certain general conclusions that can nevertheless be of limited relevance.

BACKGROUND OF THE STUDY AREA

Patna is India's capital and main state city of Bihar. In 2011, Patna city was reported to have 1,68 million inhabitants, making it India 's 19th largest city. With an area of 250 km2 and a population of over 2 million residents, Patna 's urban agglomeration is India's 18th highest. The new town of Patna is on the southern side of the Ganges river. The city is around 35 kilometers long and about 16 and 18 kilometers wide. There are 30 wards in this city group, many of which are on the banks of the river Ganga. The research was carried out in ward slums 23 and 24 on account of the spatial position of these wards, as slums are situated in these wards at the bank of the river.

METHODOLOGY

Ten households have been chosen to calculate the regular rate of waste output. They each got a 20L bucket and were requested to position their waste. The bucket was weighted every 24 hours, and the family members were separated by weight, and the waste generation output was measured. The field research was carried out for 10 days to define the average waste generation rate.

To test the water quality of the river 6 points were chosen in the river and the water quality of some water parameter calculated. The pH content was tested for Turbidity, Electric Conductance (EC), Dissolved Oxygen, ORP, Biochemical Demand (BOD), Chemical Oxygen Demand (COD), Total Dissolved Solids (TDS) and Total Solid (TS). Total Dissolved Solids (TS) were calculated. Multi 3430 IDS: Multi-parameter portable automated meter for research in the field and for laboratory research Local DPHE (Public Health Engineering Department) was used.

DATA ANALYSIS AND RESULTS

DAILY WASTE GENERATION

Day-to-day waste production of various households outside waste management due to the close roads linking their homes. You used to go through the waste straight to the river or often catch the waste and often little family members left you on the water. Some households rendered drains to the river that they passed through to the river without getting close to the water.

Name of the House hold	No of Family members	Weight of Daily waste (kg)											Rate of waste Generation (kg/day)
		Day										Average (kg)	
		1	2	3	4	5	6	7	8	9	10		
A	6	3.6	3.5	4	6.2	4.1	3.9	4.3	2.2	2.6	2.8	3.72	0.62
B	7	5.6	2.6	6.4	1.3	2.9	5.6	6.5	4.2	4.8	4.6	4.45	0.64
C	6	1.2	2.9	1.5	2.6	1.4	3.2	1.5	1.6	2.3	1.4	1.96	0.33
D	8	2.2	2.6	2.5	1.8	0.9	2.6	2.1	6.5	1.3	4.5	2.70	0.34
E	8	1.3	4.5	1.8	2.5	2.6	2.4	2.3	2.6	2.5	1.2	2.37	0.30
F	12	3.6	6.2	1.5	3.8	4.8	7.2	5.2	4.3	6.2	7.1	4.99	0.42
G	15	4.5	5.6	2.3	8.2	5.6	4.5	5.4	7.2	5.5	5.6	5.44	0.36
H	6	2.6	2.5	2.3	2.4	2.5	2.1	2.2	2.2	2.3	2.6	2.37	0.40
I	8	3.6	1.3	2.3	5.4	1.3	6.3	5.6	2.6	2.6	2.8	3.38	0.42
J	9	5	2.6	1.8	2.6	2.6	1.3	1.2	5.2	5.4	1.9	2.96	0.33
Average												3.43	0.41

To test the consistency of the river water 6 points were chosen in the river. Among points 2 of the points (Point A and B) were situated in front of the river slums, 2 of them (Point C and D) were adjacent to the slums, and two were in the river without a slum or sources of pollution (Points E & F).

Water quality parameters at different points

Point	Position in the River w.r.t. to Slums	Water Sample Depth(ft)	Temperature (°C)	pH	EC (µS/cm	DO (mg/L)	ORP (mV)	Turbidiy (NTU)	TDS (ppm)	BOD (ppm)	COD (ppm)
A	u/s	1	26.2	7.26	703	5.91	-56.75	112	1600	41	75
		2	26	7.26	703	5.9	-58.92	118			
		3	26	7.25	705	5.9	-59.2	116			
B	u/s	1	27.6	7.63	693	4.26	-78.25	130	1152	45	89
		2	27	7.58	705	4.21	-72.63	132			
		3	26.2	7.66	706	4.2	-71.16	136			
C	Beside	1	27.5	7.88	709	3.86	-95.62	190	1268	52	112
		2	27.2	7.86	709	3.85	-96.51	190			
		3	27	7.85	709	3.86	-96.55	191			
D	Beside	1	26.9	7.69	713	2.91	-102.6	225	1380	88	180
		2	26.6	7.89	715	2.95	-102.8	226			
		3	26.2	7.66	715	2.95	-102.4	225			
E	d/s	1	27.3	7.97	713	4.62	-98.5	256	1150	56	108
		2	26.8	7.92	713	4.6	-98.4	256			
		3	26.3	7.66	713	4.61	-98.3	256			
F	d/s	1	26.9	7.99	714	4.77	86.25	160	980	44	82
		2	26.8	7.85	714	4.75	86.3	165			
		3	26.8	7.63	715	4.77	86.5	165			

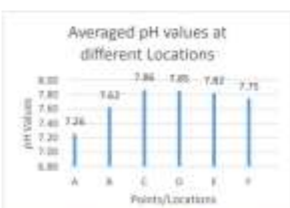

Figure 5: Averaged pH values at different Locations

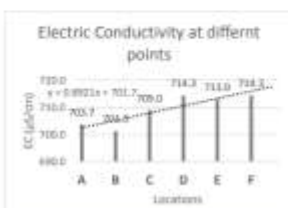

Figure 6: Electric Conductivity at different points

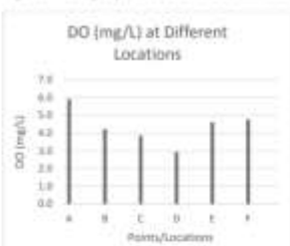

Figure 7: DO (mg/L) at Different Locations

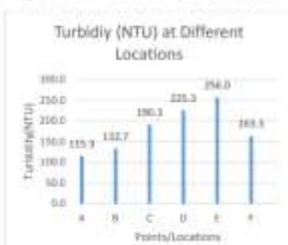

Figure 8: Turbidity (NTU) at Different Locations

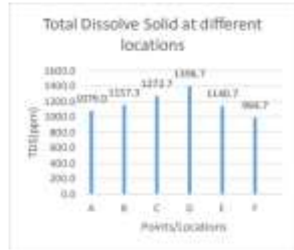

Figure 9: Total Dissolve Solid at different locations

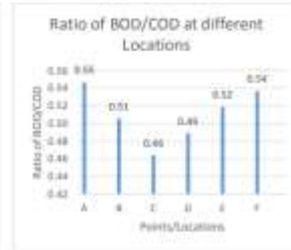

Figure 10: Ratio of BOD/COD at different Locations

Comparison of ratios of various parameters used to characterize wastewater

Figure 5 indicates pH values that are marginally above 7, which implies that the water has a higher alkalinity that is an emission sign. Since the pH level is not that big the waste disposal rate will increase. Figure 6 indicates a tendency towards rising salinity or energy in river water which is growing faster as the waste discharge points are moved through the slum. Figure 7 indicates a drop in oxygen levels at slum points in river water. This will destroy fish and other marine flora and fauna. Figure 8 suggests a rise in river turbidity, which persists before waste is released from the slum and is deposited after a long way from the slum sites. This turbid water lowers the Padma River's natural aesthetics. The TDS values indicate great riverbed pollution at a minimum value of 994.7 mg / L or parts per million and the maximum value of 1396.7 mg / L at the slum side of position D. Figure 9's most significant results are that no water from the points above can be consumed. The final figure (Figure 10) corresponds to the outcome of the BOD-COD ratio. It was identified at about 0.5, which suggests that the water is polluted but not so much toxic or toxic but can be treated (Samudro and Mangkoedihardjo 2010)[4]. Strong BOD and low DO amounts suggest the bacteria use more oxygen.

Type of wastewater	BOD/COD
Untreated	0.3 – 0.8
After primary settling	0.4 – 0.6
Final effluent	0.1 – 0.3

Source : (Samudro and Mangkoedihardjo 2010)

MAIN FINDINGS

Data and statistics above indicate that the slums contaminate water by disposing of their domestic waste. However, residents in slums are not solely liable for this waste. They do not have urban waste collection services. They almost have no healthy place to dispose their waste other than the water. While this amount of contamination remains insufficiently high as industrial pollutants or other significant pollutants if the authorities do not make the required measures to develop waste treatment facilities in the slums, this contamination will become a danger to lives reliant on the river.

SUGGESTIONS

1. Actually, the business organization employs such a waste disposal scheme, that the public corporation's sanitation department employees switch house to house every day for waste processing. The path to the slum household is so small that the collection vehicle cannot enter the residence. The municipality should change the vehicle model it is using today. Trolly with one wheel (Figure 11) might be a reasonable way to catch the waste.

2. Recycling may be a really successful way to demonstrate a safe resource recovery route according to the creation of composting waste (Yasmin 2009)[5].

3. Increasing consciousness among the slum residents regarding the detrimental impact of throwing waste into the water.

4. Improving slum facilities, such as sanitation, road clusters, lighting protection, etc. (Fayaz and Bhat 2007)[6].

5. According to (Lohri, Camenzind and Zurbrügg 2006)[7], private firms were able to illustrate outstanding operation at reduced prices.

CONCLUSIONS

The Ganga is one of the most important rivers in the economy. Pollution of the water is no less than pollution of the shore. This biggest blessing falls from Patna into Bihar. Therefore, if the water upstream is poisoned, there is still a greater risk of downstream contamination. Food waste, medicinal waste, river pollutants, and household waste does very little in contrast with past waste. Yet whether the government is worried regarding slum contamination (household waste), the danger may be great in certain recent years. Because of the analphabetism slum, people do not think for a safe climate. While they pay municipal taxes adequately, hardship renders it difficult for them to get the municipal services. The authorities must therefore place a good emphasis not only on improving the slum situation but also on the entire region, because this is largely based on ganga.

REFERENCES

[1] O. O. Olanrewaju, A. A. Ilemobade. 2009. “Waste to Wealth : A Case Study of the Ondo State Integrated Wastes Recycling and Treatment Project , Nigeria.” European Journal of Social Sciences 8(1): pp. 7–16.

[2] A, Fakere Alexander, Fadairo Gabriel, and Oriye Olusegun. 2011. “Domestic Waste Management and Urban Residential Environment : Focus on Domestic Waste Management and Urban Residential Environment : Focus on Akure , Nigeria.

[3] Islam, M.S., T.R. Tusher, M. Mustafa, and S. Mahmud. 2010. “Effects of Solid Waste and Industrial Effluents on Water Quality of Turag River at Konabari Industrial Area, Gazipur, Bangladesh.” Journal of Environmental Science and Natural Resources 5(2): pp. 213–18. http://banglajol.info/index.php/JESNR/article/view/14817.

[4] Samudro, Ganjar, and Sarwoko Mangkoedihardjo. 2010. “Review on Bod , Cod and Bod / Cod Ratio : A Triangle Zone for Toxic , Biodegradable and Stable Levels.” International Of Academic research 2(4): pp. 235–39.

[5] Yasmin, Suraiya. 2009. “A Review of Solid Waste Management Practice in Dhaka City, Bangladesh.” International Journal of Environmental Protection and Policy 5(2): pp. 1

[6] Fayaz, Sameer, and Mohammad Sultan Bhat. 2007. “Developmental Planning for the Slums in Srinagar City.” (August).

[7] Lohri, Christian Riuji, Ephraim Joseph Camenzind, and Christian Zurbrügg. 2006. “Financial Sustainability in Municipal Solid Waste Management - Costs and Revenues in Bahir Dar, Ethiopia.” Waste Management 34(2): pp. 542–52.

[8] Newspaper, Hindustan (Hindi), 2002, 2003, 2009, Patna edition.

[9] Prakriti, Centre for Management Studies, Dibrugarh University as part of the National Environment Awareness Campaign, 2006 – 07 for distribution through its website

[10] Ramachandra T. V., “Integrated Management of Solid Waste” Chapter 30

[11] Indian Institute of Science, Bangalore - 560012

[12] Ristic, G. 2005. Basic indicators of integrated solid waste management. Working and Living Environmental Protection 2: pp. 383-392.

[13] Sahely, H. R., C. A. Kennedy & B. J. Adams. 2005. Developing sustainability criteria for urban infrastructure systems. Canadian Journal of Civil Engineering 32: pp. 72-85.

[14] Sarkhel, P. & S. Banerjee. 2009. Municipal solid waste management, source-separated waste and stakeholder's attitude: a contingent valuation study. Environment, Development and Sustainability. (In press).

[15] Sekher, M. 2008. Tackling society's "detritus": Stakeholder partnerships and urban service delivery in India. Asian Journal of Political Science 9: pp. 54 -77.

[16] Sessa, A., G. D. Giuseppe, P. Marinelli & I. F. Angelillo. 2010. Public concerns and behaviours towards solid waste management in Italy. The European Journal of Public Health. (In press).

[17] Sharholy, M., K. Ahmad, G. Mahmood & R. C. Trivedi. 2008. Municipal solid waste management in Indian cities – A review. Waste Management 28: pp. 459-467.

[18] Shimura, S., I. Yokata & Y. Nitta. 2001. Research for MSW flow analysis in developing countries. Journal of Material Cycles & Waste Management 3: pp. 48- 49.

Corresponding Author

Udesh Paswan*

Department of Zoology, A. N. College Patna, Magadh University