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Review Paper

Municipal Textile Waste and Its Management

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Abstract

Municipal Waste, the trash consisting of everyday discarded items has been identified as one of the major cause of pollution. This waste includes products like paper, scraps of plastic, metals and food, textile etc. These components need to be addressed to reduce the pollution. Textile waste comprises of waste created at industrial level (damaged textile, cut and sew waste) and at household level (worn out clothes). The recycling by reprocessing and reusing of waste collected from both levels may help in reducing pollution to some extent. The textiles composition effect the method of recycling. Ways by which textiles can be recycled includes: i. Sending waste textile to the flocking industry where the shredded yarns are used for making filling material for automobile insulation and roofing felt. ii. Recreating new household items from used clothes. This Paper throws light on managing textile waste which is a component of the municipal waste and poses a threat to the environment. The methods suggested will drive a campaign towards reprocessing textile waste, utilizing waste and developing innovative products from the waste which in turn will help in reducing the textile waste to some extent in the municipal waste.

Keywords: Municipal waste, reprocessing, textile, recycling.

Introduction

Pollution has become a cause of major concern in present scenario as it is greatly affecting the eco-system of the planet earth. There are many factors leading to environment pollution. For a developing nation like India, rapid growth of industries is essential for economic development. But the factor which goes parallel with industrial growth is by-product of industrial processes[1]. Apart from industries by-product other factors responsible for polluting the environment is the awareness about disposal of waste amongst the public, who also does not have adequate facilities for dealing with waste.

In order to save environment from the pollution created by industries and public at large various method and techniques including municipal waste management had been used tried out to reduce the pollution to some level[1] municipal waste has been identified as one of the major contributor to the pollution.

Content

"Municipal Waste" is the trash or garbage consisting of everyday items that are discarded by the public[2]. It contains a multitude of products like paper, aluminum cans, glass, batteries, plastic scrape, bottles wherein rubber, leather and textile, yard trimming, food scrape are minor components which are not dealt with properly[3]. Whereas management of these wastes will lead to reduce waste, utilize the waste and make some innovative products from the waste[1] and in turn save environment from the waste added by the industries and people at large.

Waste polluting the environment can be classified into two categories: i. Hazardous Waste, ii. Non- Hazardous Waste

Hazardous waste is the waste that posses substantial threats to public health or the environment e.g.: batteries, tires, used oil and gypsum which have hazardous content. Characteristics of hazardous waste are flammability, reactivity, corrositivity and toxicity[4].

Non- Hazardous Waste are solid waste which do not harm public health and environment directly e.g.: wood, bricks, paper, natural fibers[5]. Characteristics of Non-Hazardous Waste are inflammability, odor free, non reactivity and no toxicity to health.

RCRA (Resource Conservation and Recovery Act) defines solid waste as any garbage or refuse, and other discarded material, including solid, liquid, semi-solid or contained gaseous material resulting from industrial and from community activities[6].

The main constituent of the later group i.e. from community is municipal solid waste which includes paper yard waste, wood, metal, glass, food waste, plastic rubber, leather, textiles, household waste and miscellaneous inorganic waste[7].

Following figures-1 give the data pertaining to municipal waste generated in 2012.

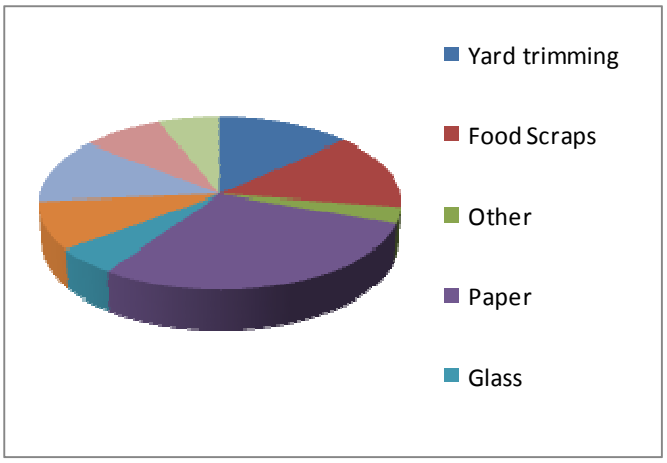


Figure-1
Total Munciple Waste Generated Before Recycling (2012)

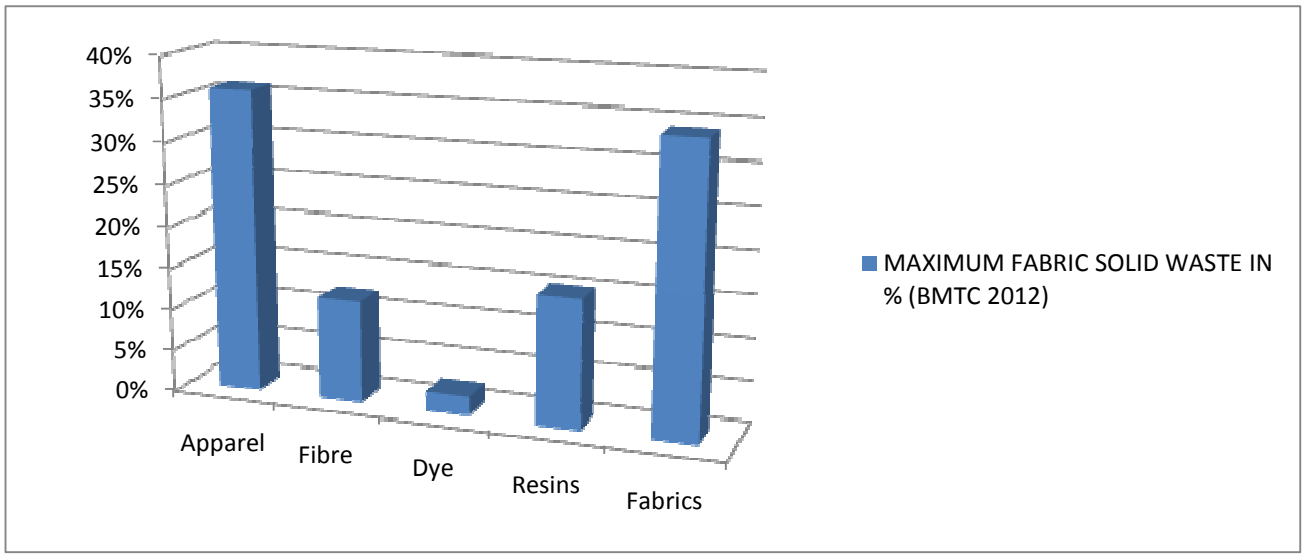
The above figure indicates that 29% of waste is from paper and 13% of waste is contributed by yard trimmings followed by the waste of food scrape. Remaining 11% of waste is from plastics, 9% from metals and 7% from waste glass which are major recyclables. The minor components i.e. 8% rubber, leather and textiles and 6% wood are not dealt with properly[7]. But if we can reduce it to zero then at least pollution created by the later will be reduced and waste can be used for innovation purposes and thus increasing the economic and utilization value of the waste.

Textile Industry is almost the most essential consumer goods industry. However it is also accused of being one of the most polluting industries. Not only production but consumption of textile also produces waste[8]. This leads to think about recycling and effective management of textile waste.
In 2007, Michael Munger, Chairman of political science at Duke University wrote that "If recycling is more expensive than using new material, it can't possibly be efficient". And so recycling i.e. reused and reproduction of textile and fibers from textile waste should be cost effective also[3].

Majority of Textile waste comes from household sources, generally thrown as old clothes. Sometimes even "not so worn garment are also discarded as they become unfashionable or undesirable" These are termed as post consumer waste[8] .Textile Waste is also produced during yarn and fabric manufacturing processes and from retail industries. These are called post industrial Waste.

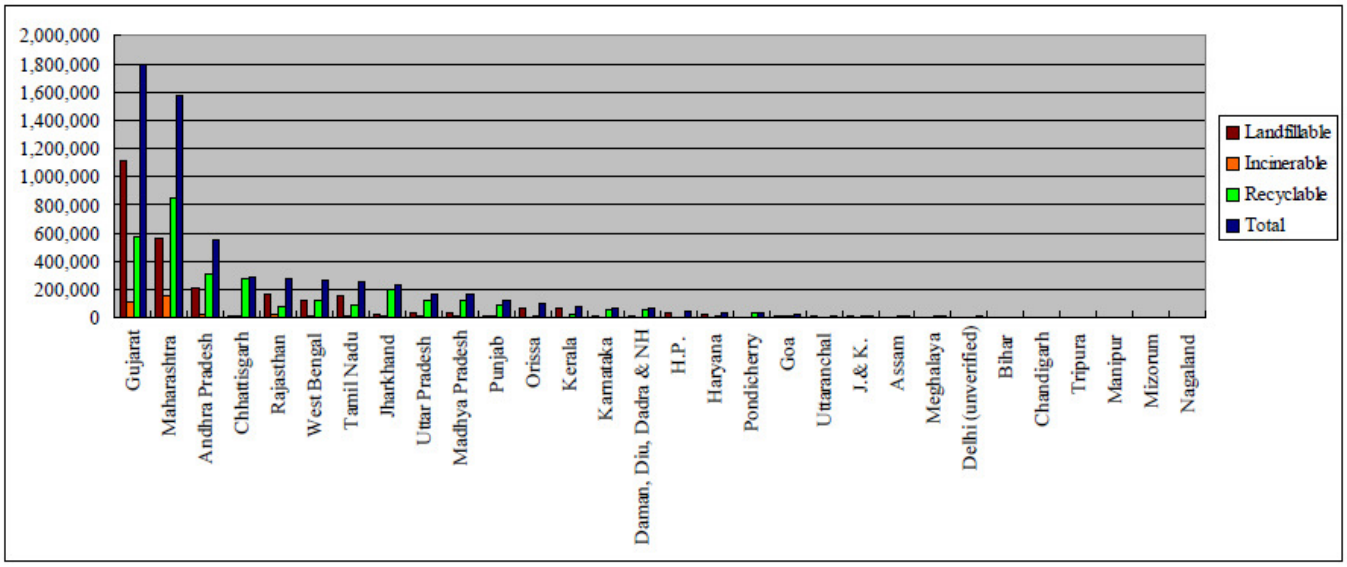
Textiles manufacturing processes like warp preparation, weaving, dyeing, printing, finishing, and quality and process control, generates lot of waste during these process. The major wastes generated by this sector are fiber wastes, yarn spinning waste (hard Fiber), off cuts waste, packaging and spool. Also wet finishing processes uses up to 200 liters of water / kilo gram of fiber making water polluted[9].

This data of metropolitan city like Bangalore shown in figure-2 shows the textile waste collected by BMTC in 2012. It shows that maximum waste of 36% is from apparel and 34.4% from fabrics. The graph indicates the increased standard of living as with the higher standard of living, luxury for life also increases. Other 15.2 % of solid waste is of resins, 12.2% contributed by fiber and 2.3% from dyes[10].



Source: Bangalore Metropolitan Transport Corporation, 2012

Figure-2
Maximum Fabric Solid Waste from Bangalore



Source: Central Pollution Control Board

Figure-3
Waste Generation Situation in India

According to the Statistic of Central pollution control board, waste generated in all over India was about 6.23 million tons .When it was compared with that in Japan, Japan generated 400 million tons according to the statistical data from the Ministry of Environment of Japanese .Hence it indicates that India generated 1/67 of waste in comparison with gross generation of Japan. From the figure no: 3 it can be seen that Gujarat is the largest generator of major waste generation state in India. It accounts for about 28% of gross generation of Industrial waste in India. Moreover the ratio goes up to 61% with land fillings.

Table-1
Urban Agglomeration in Terms of Population

Cities	Population
Mumbai	18.4% Millions
Delhi	16.3% Millions
Kolkata	14.1% Millions
Chennai	8.7% Millions
Bangalore	8.5% Millions

Source: census india.gov,in/2011- Documents/UAs- Cities-Rv-ppt

The above table gives the top five Urban Agglomerations in terms of population. It shows that the growth of urban population is at much faster rate than the growth of rural population. India has 475 UAs, three of which have population over 10 million[11]. Thus the very high rate of urbanization coupled with improper planning and poor financial conditions have made MSW management in Indian cities a herculean task. It was estimated that total solid waste generated by 217 million people living in urban areas are expected to increase from 83.8 million tons in 2015 to 221 million tons in 2030[12]. This ignites thinking for waste management.

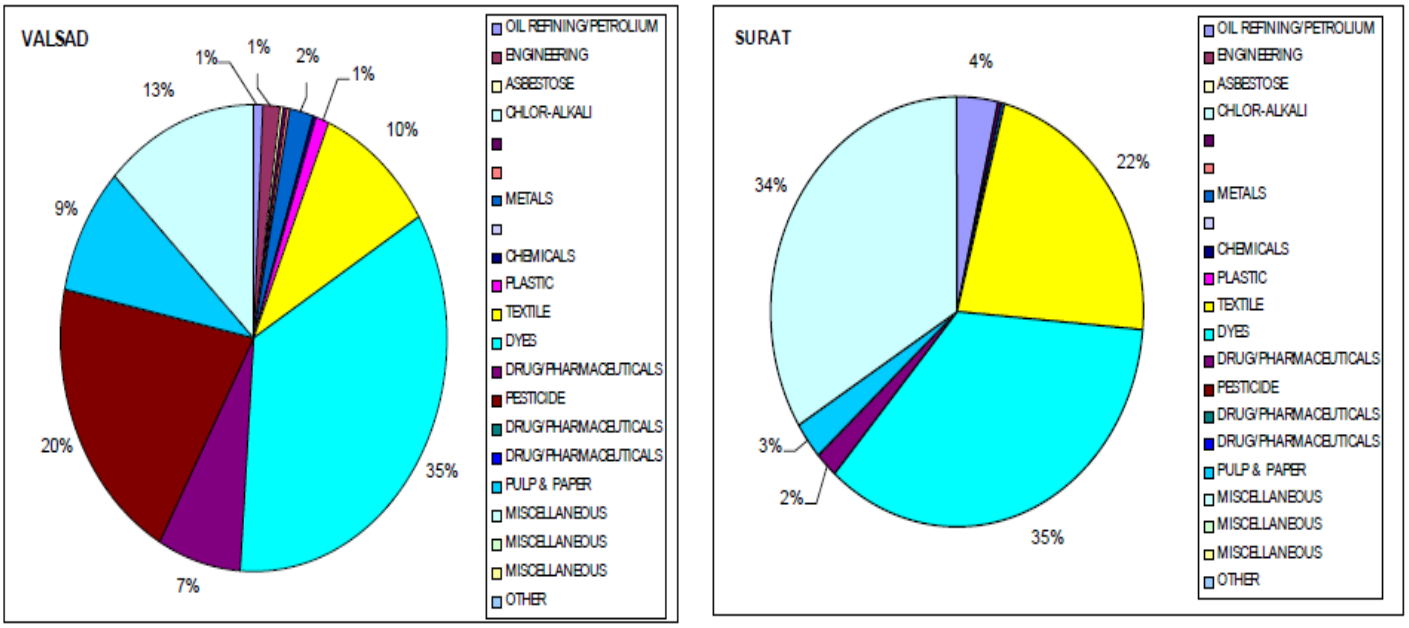
The two most favored textile hub of Gujarat produce 10% and 22% of textile waste respectively. According to the data collected by Gujarat environment protection and infrastructure limited shows that dyes has the major contribution which has polluted the environment along with the waste bodies[13].

Levels for Waste Management

"Management" means managing things for utilization of resources in best manner, which can help to save time, cost and resources. In context with waste, waste management implies to manage waste in the way that can reduce, utilize and suggest innovations from the waste[1].

It is like two way benefits of saving resources as well as following governance norms and policy. Waste can be managed at two levels i.e. 1. Industrial level 2. Household level

Waste management at Industrial level: Non hazardous Textile Waste at Industrial level generally includes fibers, yarn, cut off fabric pieces, defective fabrics with construction, extra fabric cutting, contributed by various industries and factories at large. 10-15% of Waste produced by industries is hazardous and the generation of hazardous wastes is increasing at the rate of 2-5 % per year.



Source: GEPIL, prepared by study team

Figure-4
The textile hub in gujarat (India)

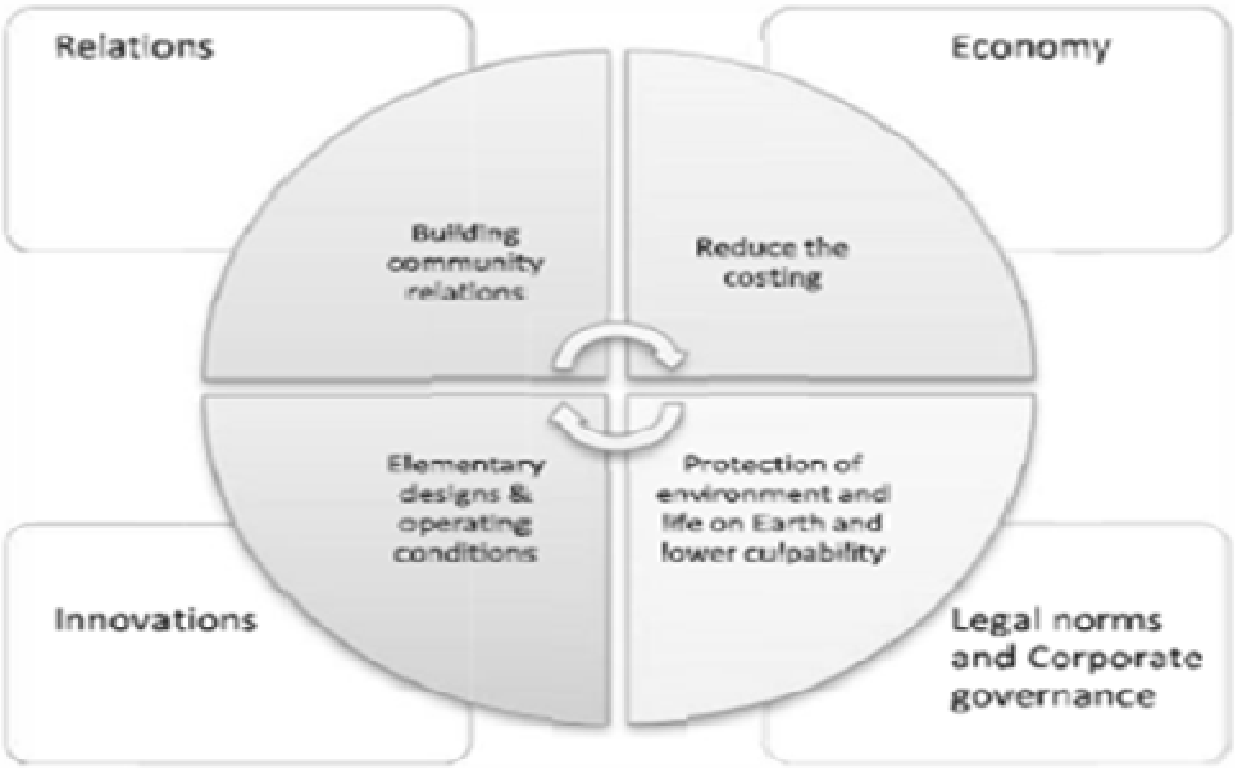
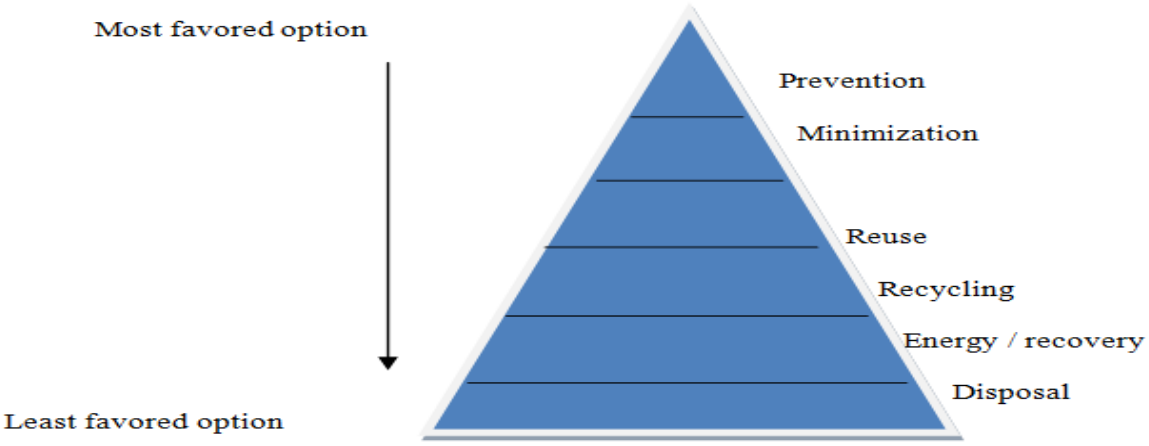


Figure-5
Components of Waste Management



Source: Solid waste process (waste recycle body 2013)

Figure-6
Solid Waste Processes

As suggested in figure no: 6 Instead of disposing fibers , used clothes and other textiles waste in landfills if we reuse them to make some innovative product then it will save our energy and the 2 R^S (reuse and recycling) is done to the minimization of waste and at the end we can prevent or reduce the waste[14].

So, if we follow the hierarchy as suggested by the figure that disposal should be last step starting from prevention to recovery then waste could be managed effectively.

Steps

To follow the suggested chain following steps should be adopted: i. Pure white cotton fibers may be converted to superabsorbent polymers by chemical modification and can be used for production of medical textiles i.e. in diapers. ii. With low quality material, there is another possibility for developing super absorbent agro- textiles for water storage and controlled water release for plantation in arid or desert land. iii. It may be possible to produce cellulose in the powder form, which can be used as fillers, or for blending with other polymers for developing composite materials. iv. Wool Fibers normally recycled by blending with new wool to produce new textile product .The final product may be little harder, but surely long lasting. v. Polypropylene which is widely used in the production of sport wear can be reprocessed by producing pellets/ master batches and further molding into different plastic component.

We can conclude that following three steps will help in reducing pollution at industrial level: i. Use of new, less polluting technologies. ii. Effective treatment of effluent so that it conforms to specified discharge requirement. iii. Recycling waste several times over before discharge, which is considered the most practical solution.

Benefits of reducing Wastes at Industrial level[15]: i. Reducing the cost of purchase material (e.g.: by maximizing fiber use). ii. Increasing profitability (as lost product means less profit). iii. Minimizing Solid Waste treatment and disposal costs (and generating an alternative income stream if there is a market for recycled fiber). iv. Improving waste quality and reducing treatment costs. v. Reducing environmental impacts by reducing use of raw materials and producing less waste.

Waste management at Household level: Hazardous waste at household level generally includes products like paper, aluminum cans, metals, steel cans, tires batteries thrown by the local public at large[1].

Factors at household level contributing to the environment pollution: Increased income: With the increase in income, luxury budget of individual have increased which has lead to more discarded clothes contributing to textile waste.

Dynamic nature and fashion: Because of this nature of the fashion, people tend to discard clothes more often to acquire new fashionable garments

Worn out clothes: Normally worn out clothes are discarded without any recycling or reuse

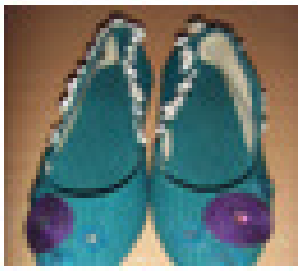
Suggested measures at household level[16]: Formal Reuse Waste can reduce by reuse of the clothes e.g.: It can be handed over to second hand shop or to the needy people who cannot afford new clothes.

Semi- Formal Reuse i.e. selling on website e.g.: on Ebay and OLX

Informal Reuse e.g.: children inherits clothes from siblings, friends sharing clothes

Making products by reusing discarded fabric or clothes

Non- Textile waste
Table lamp



Textile waste
Foot wear

Textile waste
Bed Spread

Non Textile Waste
Show Piece

Figure-7
Products Made From Textile and Non Textile Waste

Benefits of reducing waste at household level: i. It can generate extra income with the use of waste. ii. People get innovative product of textile waste. iii. Reduce waste leads to reduce the pollution in water bodies and on land at large. iv. Improving the living condition of poor people. v. At the end it contributes to the improvement of economic condition of family and nation at large.

Conclusion

Waste management is the concept which helps to save environment, to reduce the cost and other monetary benefits to company and people in different way. It is the basic need for any industry and local people to have pollution less environment. It is like two way benefits of saving resources as well as following government norms and regulation. Waste minimization is instrumental in decreasing pollution load and to some extends production costs.

Recommendation: i. Awareness raising activities as seminars and workshop on hazardous waste for waste generators and waste treatment facility. ii. Development of information education and communication (IEC) material. iii. Training programs for regulating officers to enhance the implementing capability. iv. Public awareness of health education should be raised through public campaigns. v. Monitoring facilities regarding pollution have to improve. vi. Proper implementation of laws and regulation. vii. Improved collection and transportation equipments. viii. Public awareness of waste segregation recycling and reuse to be raised through public campaigns and media demonstrations through NGOs. ix. The municipality should facilitate innovative community, based programs rather than capital-intensive projects. There are solutions but problems need to be addressed in effective manner and solutions to reach to the public. The suggestions given in this paper are simple and affordable and if followed , will certainly help in reducing pollution to some extent.

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