

Is it possible to create a Zero-Waste Environment in West Bengal?

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Abstract

The author in this paper has done a holistic study on the waste management system in urban locales in India, especially the one in place in the state of West Bengal. Her study is premised on her hypothesis that the existing environmental regulatory system in India is not keeping pace with rapid urbanisation which in turn has been negatively impacting the health of all living beings in the era of Climate Change.

She begins by defining urbanisation and explaining how there are many ill-impacts of this phenomenon, but that she would limit her scope to the study of Urban Waste Management System in the state of West Bengal, India. Her primary focus in this paper has been on the way waste is handled once it is generated in West Bengal, but she emphasises that the focus should ideally shift to reduction of waste or adapting to zero waste habits soon. For this purpose, she has studied elaborately contemporary practices employed by non-governmental entities who have worked in preventing and managing waste beyond their legal duties and outside the scope of supervision of the government. She offers in her conclusion that if appropriate modifications are made in the legal regulatory framework the face of waste management in the state of West Bengal can alter substantially.

Key Words: Zero-waste, Waste management in West Bengal, Plastic, Climate Change, Carbon Footprint, Central Pollution Control Board, West Bengal Pollution Control Board

1. Introduction

1.1 What is Urbanisation?

Urbanisation is often defined in terms of the proportion of population residing within a geographical limit. It is characterised by high density and is closely associated with modernisation and industrialisation². Unlike rural areas, where inhabitants are associated through common bloodlines, intimate relationship and communal behaviour, urban settlement of towns and cities are characterized by distant bloodlines (diversity), unfamiliar relations and competitive behaviour.

Urban areas are today identifiable as centres of innovation, culture and arts. It is distinguished from the rural areas by its improved opportunities of jobs; better education, housing, medical, transportation,

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² The future of the City-Cities of the Future, Michael Pacione, Geography, Vol. 86, No. 4 (October, 2001), pp. 275-286 at p. 275

entertainment industries and distinguished lifestyle, amongst other things. There is seemingly no such kind of resource that is unavailable to the urban inhabitants.

But the picture isn't that rosy from all fronts. Rapid urbanisation has put a strain on the environment over the years leading to its degradation, which in turn has had a significant impact on the quality of human life and the overall ecology in the world³. Apart from the problem of implementation, the laws that have been formulated over the last few years have primarily focused on being anthropocentric, with very less regard for the millions of other beings we humans continue to share the planetary space with⁴.

Only 4% of the world's terrestrial surface comprises cities. This small area is home to nearly half of the world's population⁵. The United Nations has predicted that by 2025 around 65% of the world populace will live in urban settlements⁶. Therefore urbanisation seemingly is an unavoidable phenomenon in the near future and assessing its growth vis-à-vis sustainable development goals is the need of the hour.

There are many impacts of urbanization upon the environment, but the author will be limiting her research to only one aspect of it, namely, Urban Waste Management and more specifically Urban Waste Management in the State of West Bengal.

2. Understanding Urban Waste Management: It's Nature and Quantum

According to a 2016 study titled "Status and Challenges of municipal solid waste management in India: A review" (henceforth "2016 Study") there has been no concrete steps taken over the years to quantify and analyse regional and geographical-specific waste generation patterns at a pan India level. There have been some fragmented studies conducted by Central Pollution Control Board (CPCB), New Delhi; National Engineering and Environmental Research Institute (NEERI), Nagpur; Central Institute of Plastics Engineering and Technology (CIPET), Chennai; and Federation of Indian Chambers of Commerce and Industry (FICCI in 2009), New Delhi, but nothing at a pan-India level, that has holistically engaged in

³ Annual Report 2017-2018, West Bengal Pollution Control Board, at p. 40

⁴ Igniting Iconoclasts, Shamad Basheer, Audi Alteram Partem, NLU Delhi, October 2014, as available at <https://spicyip.com/wp-content/uploads/2014/11/The-Iconoclast.pdf> [Last visited: 1.8.19]

⁵ The Environmental, Social, and Health Dimensions of Urban Expansion, Charles L. Redman and Nancy S. Jones, Springer, Vo. 26, No. 6, (July., 2005), pp. 505-520 at p. 505

⁶ Supra Note 1, at p. 275

understanding the nature of waste generated in India, its segregation pattern, storage, transportation and disposal.⁷

However inspite of the lack of a detailed study, 'waste', has been understood as useless, unwanted or discarded material resulting from agricultural, commercial, communal and industrial activities. Waste includes solids, liquids and gases. Urban waste means the waste generated by any activity in urban or peri-urban areas. This implies that urban waste is not only generated in households, but also that from commercial establishments and services, street sweeping, green areas and industry.⁸ It can be broadly categorized into: Solid waste, hazardous waste, biomedical waste, plastic waste, e-waste, construction and demolition waste⁹.

Urbanization contributes to enhanced generation and unscientific handling of various types of wastes that degrades the urban environment and causes health hazards¹⁰. India has also not been able to escape this phenomenon. It is a vast country divided into 29 States and 7 Union Territories (UTs). There are three mega cities—Greater Mumbai, Delhi, and Kolkata—having population of more than 10 million, 53 cities have more than 1 million population, and 415 cities having population 100,000 or more. About 31.2% population is now living in urban areas. Over 377 million urban people are living in 7,935 towns/cities.¹¹

The cities having population more than 10 million are basically State capitals, Union Territories, and other business/industrial-oriented centers¹². It has been noticed that residents living in these zones have different consumption and waste generation patterns.¹³

From the little that is evident from the above studies, is that the rate of generation of waste has only increased over the years and has been predicted to increase at an unmanageable level if the pace of present waste generation continues. For instance NEERI carried out a study in 59 Indian cities (35 Metro cities and 24 State Capitals) in the year 2004-2005 and found out that 39,031 TPD of MSW was generated. Later, in 2009-2010, CIPET (for CPCB) did a similar the study for the same 59 cities/towns

⁷ *Ibid*

⁸ "Urban Waste Generation and Classification", in Guidelines for Municipal Solid Waste Management in the Mediterranean Region, p.3-1, as available at <https://www.scribd.com/document/261216155/3-Urban-Waste-Generation-and-Classification> [Last visited: 1.8.19]

⁹ *Supra* note 2, p. 45

¹⁰ "Status and Challenges of municipal solid waste management in India: A review", Rajkumar Joshi and Sirajuddin Ahmed, Cogent Environmental Science, 2016, as available at <http://dx.doi.org/10.1080/23311843.2016.1139434>

¹¹ *Ibid*

¹² *Ibid*

¹³ *Ibid*

during the year during 2009–2010 for CPCB and found out that 50,592 TPD of waste was being generated. According to CPCB, in year 2011, it only increased and was quantified at 1,27,486 TPD MSW, out of which only 89,334 TPD (i.e. 70%) was collected and 15,881 TPD (i.e. 12.45%) treated¹⁴. Apart from municipal waste, India generates about 12 million tons of inert waste annually from street sweeping and C&D waste¹⁵.

Planning Commission Report (in 2014) revealed that 377 million people residing in urban area generated 62 million tons of MSW per annum currently and it is projected that by 2031 these urban centers will generate 165 million tons of waste annually and by 2050 it could reach 436 million tons¹⁶. (Another study predicted that by 2051 the MSW generated would be 300 million tons per annum¹⁷). To accommodate this amount of waste generated by 2031, about 23.5×10^7 cubic meter of landfill space is required and in terms of area it would be 1,175 hectare of land per year. The area required from 2031 to 2050 would be 43,000 hectares for landfills piled in 20 meter height¹⁸.

Therefore all is not well and we need to urgently address the situation of how we manage urban waste if we are to avoid its ill effects on the health of humans and other species on this planet¹⁹.

2.1 Plastic: The Most Potent of All the Wastes Generated

Plastic takes anywhere between ‘450 years to forever²⁰’ to disintegrate, thereby contributing to the huge pile of waste burdening the earth. 79% of all plastics ever manufactured since 1950 is still in the environment²¹. Oceanographers have found large swathe in the oceans where plastic-garbage has built up, harming marine life tremendously. They call it the “great garbage patch”. The largest such patch is three times the size of France and we have eight such patches across the oceans of the world²².

So evidently plastic products, prove to be the biggest enemy of effective waste management efforts across the globe. It is as powerful as an enemy because of its tremendous utility and its versatility. The products that plastic has replaced over the years are glass, metal, cardboard, cotton (all of

¹⁴ *Ibid* at p. 4

¹⁵ *Ibid* at p.2

¹⁶ *Ibid* at p. 3

¹⁷ *Ibid*

¹⁸ *Ibid*

¹⁹ *Ibid* at p.4

²⁰ “Why world has declared a war against plastic”, p. 1, The Times of India, Kolkata, 23.08.19

²¹ *Ibid*

²² *Ibid*

which were biodegradable). There is an attempt to accentuate on recycling plastic, but it is believed that the plastic industry overstates the potential of recycling plastic: every time plastic is recycled it degrades and can't be reused as effectively as glass or metal, which therefore means that eventually we are looking at 450 plus years for the re-recycled plastic to disintegrate.

In the olden times the market was based on returnable container model which was as high as 96% in the 1950s. This returnable container model was replaced substantially by the 1970s when it fell to 5%. At the same time, plastic containers came in and created the throwaway container market. Plastic was originally used to make household items, like radios and was predominantly used in electrical wiring. Its use increased during world war II with the creation of enormous petrochemical industry by the US.²³ But this isn't the major cause of worry relating to plastic use. The real devil is the Single-Use Plastic (SUP). 40% of all plastic produced is used in packaging and in India, 80% of all plastic consumed is used in packaging. Globally, speaking, Indians are actually the world's lowest consumers of plastic; i.e., as against the global average use of plastic per person per year of 28kg, the national per person yearly average amounts to 11kg²⁴.

3. Waste Management: The Processes Followed Worldwide

There are four broad steps for effective waste management, anywhere in the world: collection and segregation and sorting (reuse/recycle), storage and treatment²⁵, transportation, disposal and treatment.

i. Segregation, Collection, Sorting

The most difficult step is perhaps ensuring segregation of waste which if managed well can ensure proper scientific disposal of waste. It is widely agreed that segregation is best done, both in terms of cost, time and effectiveness, when done at its source. Unfortunately, no city in India can claim 100% segregation of waste at dwelling unit and on an average only 70% waste collection is observed, while the remaining 30% is again mixed up and lost in the urban environment. Out of total waste collected, only 12.45% waste is scientifically processed and rest is disposed in open dumps²⁶.

At the present, sorting of waste, is mostly accomplished by the unorganized sector and is seldom practiced by waste producers. Waste producers, especially households, dump their waste in communal bins.

²³ *Ibid*

²⁴ *Ibid*

²⁵ *Supra* note 2, at p.45

²⁶ *Supra* note 10, at p. 5

Segregation and sorting takes place by Rag-pickers and municipal garbage collectors, under very unsafe and hazardous conditions. These persons concentrate on picking out from the discarded materials only those that can fetch them a return in the recycling market. The focus is not per se on segregating waste with an intention to protect aspects of health and hygiene²⁷. Rag-pickers can be useful and fully effective in sorting material for recycling, if only we employ them in large numbers, like it happens in Pondicherry²⁸. In this city, almost all recyclable material is sorted out by rag-pickers and absorbed in material stream through recycling. But this is not replicated in other cities and therefore from the unsegregated waste dumped in communal bins only materials like glasses and plastic find their way back into the system²⁹. Waste produced by commercial complexes and industrial units are also sometimes dumped in such communal bins. It is only sometimes when these entities arrange for separate garbage collection by the municipality at a certain price that these flooding communal bins are spared.³⁰

ii. Transportation

The second most challenging aspect of waste management is transporting it to the landfill sites. From the local dumping points, waste collection is done in vehicles maintained by Local Bodies. Municipal Solid waste can be transported in smaller towns, in trucks having 5–9 ton capacity which are usually used without adequate cover system. Stationary compactors, mobile compactors/closed tempos, and tarpaulin-covered vehicles are also used³¹.

iii. Disposal

If the transportation method adopted is effective, significant amount of waste should reach the intended place. There is however a strong possibility of losing some waste along the city periphery (drain, etc).³²

Once it reaches the intended site, the most difficult part of waste management commences: Disposal of waste and thereafter its treatment. There are five popular methods of waste disposal pattern: Open Dumping, land filling, land gas to energy plants, biological treatment of organic waste (aerobic composting, vermi-composting, anaerobic digestion), thermal treatment³³.

²⁷ *Ibid*, at p. 6

²⁸ *Ibid*

²⁹ *Ibid*

³⁰ *Ibid*

³¹ *Supra* note 10, p. 6

³² *Ibid*

³³ *Ibid*

The most popular way of disposing waste is by dumping it in designated landfill sites, which is based on the presumption that “dilution is the solution of pollution”. But in reality it is found that leachate formation results in contamination of the soil and of ground water too.

Leachate, is a highly toxic liquid, which is terrible for the environment and is formed when it rains and water percolates through the waste in landfill sites, picking up pollutants on its way downwards. It has been estimated by environmentalists that a typical dump, 17 acres in size produces over 4.5 million gallons of leachate a year and will continue to do so for about 50 years, long after the dump has been closed. It contains heavy metal such as cadmium and lead, solvents, ammonia, phenols, cyanide and numerous other chemical compounds. Plus, the ambient environment provided by organic waste like food scraps, old newspapers produce a leachate so rich in nutrients that it can cause algae blooms if it leaks into streams or rivers. When algae die, their decomposition rapidly removes oxygen from the water, killing fish and other animals as well as plants. Discarded household chemicals and consumer goods add toxic chemicals to the already dangerous mixtures.³⁴ There has been a belief that attenuation (the process whereby the ‘pollutant within the leachate will be rendered harmless, either by bacteria breaking them down or because they become attached to soil particles and thus immobilized’) happens and the toxicity of leachate gets rendered negative. But the capacity of the soil to attenuate pollutants has been greatly overestimated which has resulted in large-scale contamination of groundwater with highly toxic chemicals.³⁵

4. Implementation of Various Waste Management Rules in West Bengal?

The first legislation that was enacted concerning the environment was *The Air (Prevention and Control of Pollution) Act, 1981*. It was only in the year 1986 that a holistic law concerning all aspects of the environment was promulgated (*The Environment (Protection) Act, 1986*). Under this 1986 Act, specific rules relating to various types of waste was subsequently brought in over the years. For instance, *The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989*, *The Biomedical Waste Management Rules, 2016*, *The Plastic Waste Management Rules, 2016*; *The Solid Waste Management Rules, 2016*; *The Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016*; *The E-waste (Management) Rules, 2016*; *The Construction and Demolition Waste Management Rules, 2016*

³⁴ Environmental & Pollution Laws in India; Justice T.S. Doabia, I.P.S Doabia, M.S Doabia; 2nd Edition 2015, Volume 1, Lexisnexis Butterworths Wadhwa Nagpur, Haryana, p. 1102

³⁵ *Ibid*

The first legal body that was entrusted with the responsibility of implementation of the Air Act, was the Central Pollution Control Board along with its various State Pollution Control Boards. The authority remained the same, even with the passage of newer environment laws.

CPCB is a statutory board under the Ministry of Environment, Forest and Climate Change, under the govt. of India. Each state in turn have their own respective State Pollution Control Boards (SPCB).

The WBPC Board³⁶, was constituted in 1974 under the Department of the Environment, Government of West Bengal and is a diverse Board, comprising a variety of stakeholders. Dr. Kalyan Rudra, a geographer by academic training having specialisation in river and water management³⁷ heads the Board as its Chairman. There are 5 representatives (Principal Secretary and Additional Chief Secretary) of the state government from various departments such as Dept. of Environment, Dept. of Commerce and Industries, Dept. of Urban Development, Dept. of Transport, Dept. of Science and Technology; representatives of the local authorities (mayor of Kolkata Municipal Corporation, Chairman of Barasat Municipality, CEO of Asansol Durgapur Development Authority, CEO of Kolkata Durgapur Development Authority). Then there are three representatives from the Technical & Scientific Community, a Member Secretary and two representatives of the State Controlled Corporations (Directorate of Forests, Govt. of West Bengal, West Bengal Power Development Corporation Ltd.).

The WBPCB has its main office in Paribesh Bhawan, Salt Lake Kolkata and has 11 Regional offices and 5 Regional Laboratories spread over different locations the state.

There are six rules that are primarily concerned with various types of waste management in the country. The WBPCB has taken efforts to implement the following six rules. A recent detailed update on its compliance has been laid out in the Annual Report 2017-2018 of the WBPCB.

These are:

1. *The Biomedical Waste Management Rules, 2016*

Coordinating with related departments is critical to the effective protection of the environment and therefore the WBPCB has taken steps towards it and has associated itself with the Department of Health and

³⁶ *Supra* note 2, p. 1

³⁷ Nalanda University Faculty Profile, available at <http://www.nalandauniv.edu.in/news-and-events/lectures/distinguished-lecture-pollution-management-for-ganga/> [Last visited: 7.08.19]

Family Welfare to achieve the objective of management of Bio-Medical Waste.

In compliance with the requirement of R. 11(1) the WBPCB has already constituted a State Level Advisory Committee on Bio-Medical Waste and under R. 12(4) a District Level Monitoring Committees on Bio-Medical Waste.

Collection and segregation of various types of waste is, as has been emphasized before a critical to the management of waste. The Board has been trying to ensure health care units engage in proper disposal of Bio-Medical waste. To ensure this, an online application portal for receiving application for Bio-Medical Waste Authorisation has been set up. This will help in ensuring proper collection and in ensuring that bio-medical wastes do not get disposed in an unhealthy manner.

The other issue is in ensuring separate place for disposal of variety types of waste. The same landfill that is used for the disposal of municipal waste cannot be used for the purpose of bio-medical waste. There is a need for separate BMW Treatment Facility. The Board has been coordinating with the District Magistrates of a few districts along with the Department of health and Family Welfare of the West Bengal Government to develop more such facilities³⁸.

2. *The Plastic Waste Management Rules, 2016 and The Solid Waste Management Rules, 2016.*

The Board has been coordinating with the Urban Development and Municipal Affairs Department of the Government of West Bengal to achieve the implementation of these rules. The UD & MA Department has formulated and notified State Policy and Strategy for both Solid Waste Management and Plastic Waste Management in the State of West Bengal.

Apart from this, it seems that the Board has been focusing on proper use of waste that is generated. It has been working on using solid waste for energy generation. In fulfilling this objective it has provided financial assistance to Swami Vivekananda State Police Academy, Barrackpore for setting up a kitchen waste based biomethanation plant. The said plant has been successfully installed and is in operation. The biogas generated is used for cooking³⁹.

3. *The E-waste (Management) Rules, 2016.*

There are two e-waste dismantlers in the state at the moment and another unit which has applied for authorization might be coming up in the

³⁸ *Supra* note 2, p. 45

³⁹ *Supra* note 2, p. 45

coming days. But before that a study was conducted by the WBPCB to understand the quantum of e-waste produced in the state. The WBPCB has with the help of Ministry of Electronics and Information Technology conducted such inventory study and has found out that in the state 5842.43 MT of e-waste was generated in the state. This is projected to increase to 7125.15 MT in the year 2021⁴⁰.

The WBPCB itself and by funding District Authorities, have taken efforts in spreading awareness regarding e-waste and its management through various workshops in the state. A total of 14 such awareness programmes have been conducted in 2017-2018, across 10 towns/cities in West Bengal.⁴¹

4. *The Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 and The Construction and Demolition Waste Management Rules, 2016*

There is a Common Hazardous Waste Incinerator at Haldia which has been treating hazardous waste. In fact the Incinerator at Haldia also treats the hazardous waste that is brought in from Sikkim in accordance with an agreement that was drawn up between the two Pollution Boards⁴².

5. Lessons from Non Governmental Entities' Innovative Ways of Managing Waste

5.1. Removing Single Use Plastic from our Habitual Consumption List

As has been already highlighted in the previous section, of all the things that comprise waste, plastic is perhaps the most potent and lethal. Therefore, we will look at how various entities have attempted to deal with the spread of plastic use.

An average Indian consumes per year only 11kg of plastic per year, as against the global average of 28kg, but the Central government has not let this figure deter it from taking effort to further bring down the number.

i. The Environment Ministry Advisory 2019⁴³

Environment ministry had issued an advisory (keeping in mind PM Modi's call to eliminate single-use plastics by 2022) to all states and UTs to discourage use of plastic items in government offices like, artificial flowers, banners, flags, flower pots, plastic stationary (folders)⁴⁴, (Styrofoam)

⁴⁰ *Ibid*

⁴¹ *Ibid*, p. 46-47

⁴² *Ibid*, p. 45

⁴³ 'Curb mfg of single-use plastic items by October 2, states told', p. 1, The Times of India, Kolkata, 08.09.19

⁴⁴ *Ibid*

thermocool plates and PET bottles⁴⁵ etc. The focus is to locate and use biodegradable alternatives that already exist in the market. For instances bagasse/cornstarch⁴⁶/cloth bags are already available as a replacement for plastic bags.

ii. The Courageous Collector fining a Govt. School Principal in an Open Event

On 18th October, 2019 the District Collector of Bhindh District, Bhopal, took the courageous albeit unpopular decision of fining a government school principal for using single use plastic in an open event. The school was hosting a function on BioDiversity in collaboration with the forest department and to welcome its chief guests (which included the District Collector), the principal, P.S Chauhan, was carrying garlands in a plastic bag. The Collector of Bhindh District, Chotte Singh, on noticing the same fined the principal on the spot for flouting the plastic ban. He reportedly wanted to send a strong message to the students who were participating in the biodiversity function, who came from 57 schools⁴⁷.

iii. Kolkata Airport's efforts to Eliminate SUP

The Airport Director of Kolkata Airport, Kaushik Bhattacharjee, has availed the services of two green activists, Lata Bhatia and Abhinav Bajpai, for promoting sustainability in the airport by reducing single use plastic⁴⁸. The identified plastic products that are sought to be eliminated, replaced or reduced are: plastic spoons, fork, knife, plastic crockery (plates, bowls, glass), plastic bottles⁴⁹, and PET bottles⁵⁰.

iv. Plastic Straws and Restaurants/Eateries in Kolkata

Various eateries in Kolkata, like The Daily Café, Restopubs Bakstage, Motor Works & brewing Company, KFC, Subway, Seinna Café have taken their waste management responsibility incredibly well. The usual culprits in the forms of plastic straws, stirrers, and cutlery have been replaced with paper straws which are certified for use in food items. Apart from the humble paper straw, there are straws and stirrers⁵¹ made of metal, lemongrass, ice and pasta too! An ice straw last about 20-25 minutes and is served with high end liquor in Bakstage.

The non-plastic straws, like the paper straw doesn't allow the drink to move as smoothly as plastic straws, gets soggy if left for too long in the

⁴⁵ *Ibid*

⁴⁶ "Green revolution from Sweden to Kol", p. 6, The Times of India, Kolkata, 13.09.19

⁴⁷ "Principal fined for plastic use", p. 8, The Times of India, Kolkata, 21.10.19

⁴⁸ *Supra* note 46

⁴⁹ *Supra* note 47

⁵⁰ *Supra* note 43

⁵¹ "While Kolkata's popular restos say no to plastic straws...For street vendors, bearing the cost of paper straws is not an option", p. 4, The Calcutta Times, Kolkata, 30.08.19

drink and are costly. For instance a plastic straw costs around 40-50 paise as against Rs. 2-4 for a paper straw⁵². The costs is an impediment for the street vendors who additionally complain the biodegradable straws are not available at wholesale markets from where they buy their plastic straws.

It would be perhaps better, if people customers like Ishita Gupta, refuse to use a straw altogether to have their drink⁵³; we should try sipping from the glass directly or ensure that the coconut is cut in a manner that allows one to drink directly from it.

5.2. Food ATMs⁵⁴

Life on the earth is that of contrasts: a stark demarcation between those who have plenty and those who have nothing. Food wastage is as common a phenomenon as wastage of excess food is. To arrest this problems a few good souls have come up with the concept of Food ATMs.⁵⁵ Food ATM is a public fridge installed by the road-side or on a footpath, where excess food and left overs are deposited for collection by anyone in need”⁵⁶. What is interesting is that the eligibility to open the fridge and to take out food from it is not dependent on one’s economic status; i.e., “it is not for the rich or the poor but for everyone who needs something”⁵⁷. Through the 4 fridges installed in Kolkata, about 100 people are fed daily⁵⁸.

They have been globally set up in various countries- U.K, Canada, Singapore. In India we have food ATMs in Kolkata (four fridges; inside Mahadevi Birla School in Park Circus, Ram Leela Ground in Moulali); in Bengaluru (15 fridges; at Dinnur Road, Kranti Veera Sangolli Rayanna Station); Chennai (Anna Nagar, Basant Nagar Tennis Club); Guragon (Suncity), Bhubaneshwar and Dehradun. There is a preliminary installation cost of around Rs. 70,000 to 80,000 per fridge. Thereafter there is a monthly maintenance and supervision cost of Rs. 10,000/-.

Those who order excess food in a restaurant or generally have extra food that they don’t intend to eat, they can go to these community fridges and leave it there for a hungry passerby to feed on. This way the amount of food items reaching the waste bins is also substantially reduced.

⁵² *Ibid*

⁵³ *Ibid*

⁵⁴ “ ‘Fridging’ the hunger gap: How Food ATMs are feeding the poor”, (find the link), The Times of India, Kolkata, 28.10.19

⁵⁵ *Ibid*

⁵⁶ *Ibid*

⁵⁷ *Ibid*

⁵⁸ *Ibid*

i. Restarting the ‘Returnable Container Model’, Upcycling Kitchen Waste

Lata Bhatia, operates Kolkata’s first and the country’s fifth zero-waste shop in New Alipore in Kolkata. She has been personally living a zero-waste life for nearly 20 years and encourages others to adopt to such lifestyle. She sells an array of recycled and upcycled products including reusable clinical safe diapers and sanitary napkins, bags of biodegradable materials, upcycled clothes, food grains etc. She doesn’t sell food grains to a customer who doesn’t bring a container with her and is working on getting back the returnable container model of the 1950s which we nearly lost by the 1970s.

She also upcycles her Kitchen waste to make manure which she uses to nourish her terrace garden. There is nothing in her shop that is packaged in plastic; she insists that packaging was never meant to be, since “nature doesn’t give us things packaged”⁵⁹.

ii. Harvesting Trees to Grow Directly into Furniture

Trees are grown for a long duration of time, and thereafter felled using carbon heavy methods to make furniture. In an attempt to reduce wastage and reduce carbon footprint generally, a UK couple, Gavin and Alice set up their company Full Grown, in 2012. Here they harvest trees and ensure that these trees are trained to directly grow into the desired furniture. At present, in their Derbyshire furniture farm they are nurturing 250 chairs, 100 lamps and 50 tables.⁶⁰

iii. Changing the Consumption in Weddings

Tremendous waste is generated in weddings or large social events in the form of excess food, plastic decorations, return gifts/gifts and packaging of return gifts/gifts. There are a few environmentally conscious persons who are taking the lead in correcting this. For instance⁶¹, a couple, Ajay Jatav and Babita in Karoli Village, 20 km from Alwar city in Rajasthan in their wedding didn’t accept gifts at all. They infact contributed to setting up a community library and gifted saplings as return gifts to their guests. Their wedding was also plastic free.

iv. KSWMI Project, funded by Japan International Corporation Agency (JICA)⁶²

In 2016, The Kolkata Solid Waste Management Improvement Project (KSWMI) was launched in six municipalities of the Hooghly district

⁵⁹ “city’s first zero-waste shop promotes eco-friendly living”, p. 3, The Times of India, Kolkata, 28.10.19

⁶⁰ “This UK farm grows furniture”, p. 13, The Times of India, Kolkata, 24.09.19

⁶¹ “couple takes wedding vows on the constitution”, p. 1, The Times of India, Kolkata, 17.10.19

⁶² *Ibid*

in the state of West Bengal:- Uttarpara- Kotrung, Konnagar, Rishra, Serampore, Champdani, Baidyabati. It was a Rs. 170 crore project funded by Japan International Corporation Agency (JICA)⁶³ which ended in 2017 after which it has become the prerogative of the state government⁶⁴. The project ran so well that in the year 2016 in the C40 Mayor's Summit held in Mexico City, Uttarpara won the award in Urban Solid Waste Management Category defeating strong contenders in Auckland and Milan.

Households in Uttarpara segregate bio-degradable and non-degradable solid waste, which is collected by municipal workers who carry them in vans having separate chambers and dump them separately at the transfer centres. There is this process of temporarily storing the non-degradable waste before it is put in compactor machines to be compressed and dumped at the sanitary landfill. It was the only municipality from the six mentioned above in being able to complete all the procedures involved in waste management, right from segregation at source to production and sale of bio manure. Segregation at source had also started in Konnagar and Baidyabati but production of bio-manure wasn't substantial after the trial. The civic bodies were awaiting quality test report from Jadavpur University to improve the production of bio-manure⁶⁵.

At the landfill sites, in Uttarpara, rag pickers were seen collecting garbage for selling to waste dealers. There were more than two dozen rag pickers who have been hired by civic authorities to give Uttarpara the urban clean look. These rag-pickers, unlike the ones we see elsewhere in the country, are provided with proper equipment to prevent them from falling sick and to ensure that they work in hygienic environment. They were provided with masks, gloves, gumboots and uniform by the municipality and are required to mandatorily wear them while scavenging through the garbage.

While collecting things, they further segregate whatever bio-degradable waste had remained in the non-degradable lot. The bio-degradable waste goes to the adjacent compost plant. The municipality sells the bio-manure produced at the plant from its counter and through marketing agents. The municipality has been collecting approximately 12-14 tonnes of waste every day and produces about 3-4 tonnes of manure daily. They, however, have the capacity of producing up to 10 tonnes of manure per day.

Uttarpara municipality also collects waste from the sewerage system with suction cum jetting machines and the Civic chief highlighted that the goal of the municipality was to cover all drains across the town. According

⁶³ *Ibid*

⁶⁴ *Ibid*

⁶⁵ *Ibid*

to the latest data, Uttarpara-Kotrung and Baidyabati civic areas are mostly free of open dumping, while the former is also earning from sales of bio-manure. Leachate treatment facilities at the common sanitary landfill prevent ground water contamination, while garbage dumping on Bhagirathi has reduced.

v. Campaigns to Make Presidency University and Jadavpur University Plastic Free

Aryan Agrahari, a 3rd year economics student of Presidency University, has been trying to raise awareness of the 2018 guidelines issued by UGC that recommends educational campuses to segregate garbage disposals. As a part of his campaign of raising awareness amongst his batchmates and others, he has been distributing corn starch made bags as an alternative to plastic bags⁶⁶.

Swarup Kumar Das, a mathematics student of Jadavpur University, has also been trying to spread environmental awareness in his university. However, he has not roped in the University authorities yet and is doing so predominantly alone.⁶⁷

6. Conclusion: Can We Create a Zero-Waste Environment?

The answer to the first question posed in this article in the form of the title of this paper is, “*Yes, if we involve all stakeholders and consistently work towards the goal*”. It has been made evident in the foregoing sections that even if we do not generate any further waste as on 2019, we already have eight “great garbage patch” in the various oceans of the world to take care of⁶⁸. Therefore, along with attempting to manage the existing waste, we should generate a robust mechanism to encourage living in zero-waste situation. Replacing the plastic straws with biodegradable options (lemongrass and paper) is unequivocally better, but attempting to drink the coconut water directly from the coconut, or the sugarcane juice from the earthen pot, or the tea from the glass cup is better.

We, also saw how harmful even organic waste (like food scraps, old newspapers) can be when dumped along with other non-biodegradable products in the landfill sites. Leachate, which is formed when rainwater percolates through the waste in landfill sites, picks up pollutants on its way downwards. Leachate contains heavy metal such as cadmium and lead, solvents, ammonia, phenols, cyanide and numerous other chemical compounds, which is known to contaminate the soil and ground water. The presence of kitchen waste and other organic waste in such landfill sites

⁶⁶ *Supra* note 46

⁶⁷ *Ibid*

⁶⁸ *Supra* note 20

produce a leachate so rich in nutrients that it can cause algae blooms if it leaks into streams or rivers.; and when algae die, their decomposition rapidly removes oxygen from the water, killing fish and other animals as well as plants. This is why we should work on composting kitchen waste in our homes, like Lata Bhatia and other green activists.

Consumerism is perhaps to be blamed for the tremendous amount of waste generated in the 21st Century. Gifting has become a mandatory code of behavior in various social events, which only adds to further materials being discarded in the trash can. Gifting of non-essential things should be eliminated. Affection can be expressed through various other means, gifting of natural flowers, plants or towards a social cause dedicated to the intended recipient of the gift.

The Food ATMs, have been able to attain two objectives through its installation across the world and the few cities in India; that it was possible to feed the poor and also eliminate a substantial amount of food wastage that land up in the garbage bins.

We must try and return to the returnable container market, where a customer needs to return the container in which a product was purchased or she needs to bring her own container to carry the product in, like it is practiced by Ms. Lata Bhatia in her store. It is ofcourse, easier to bring one's own container to get solid stuff like rice and wheat; but it is more realistic to encourage a subsidy to those who return containers like shampoo bottles, cold drink bottles, when they go to purchase their next product.

Lastly, the author would like to conclude by stating that legislation can be one of the weapons in the armory, but it cannot be the only weapon to tackle the problem of waste management in the country. While punitive measures is believed to have a deterrent factor, as was hoped by the District Collect of Bhindh District, Bhopal, it would be a fallacy to consider it to be the only way to effectively deal with the menace of waste burdening our earth. Conducting awareness programme for the adults and inculcating knowledge regarding waste management in the educational system is the biggest need of the hour. We need to acquaint our family members friends and colleagues that it is possible to live a zero-waste life. And to spread such awareness, there is no better entity positioned at a vantage point like the government. Replacing the plastic straw might not be possible for the poor street vendor in Kolkata who complained about the substantial price difference between the plastic and the other biodegradable straws; but it is possible for government offices to replace the thermocol/plastic plates used in offices with bagasse/cornstarch plates in its government events.

We definitely have a long way to go, but if all of us together take a step forward we would have traversed a vast distance towards our desired objective of living in zero-waste environment.