

Observations from India's Crisis

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WTERT-India	Outcomes from WTERT-India's 1 st <i>International Brainstorming Workshop</i> on the topic "Waste to Energy in India" organized in Mumbai – August 23-24, 2012 can be found here . More information about the next event in February, 2013 can be found here .

In 2012, for the first time in the history of India, the country has seen nationwide public protests against improper waste management - from the northernmost state Jammu and Kashmir to the southernmost Tamil Nadu. A fight for the right to a clean environment and for environmental justice led the people to large scale demonstrations, including an indefinite hunger strike and blockade of roads leading to local waste handling facilities. Improper waste management has also caused a Dengue Fever outbreak and threatens other epidemics. In recent years, waste management has been a major unifying factor leading to public demonstrations all across India, after corruption, fuel prices and a young woman's gang rape. Public agitation has resulted in some judicial action and remedial response by the government, however, the waste management problems are still unsolved and might lead to a crisis if the status quo persists without any long term planning and policy reforms.

Hunger Strike in Kerala

The President of Vilappilsala Village Panchayat went on a hunger strike recently, against her counterpart, the Mayor of Thiruvananthapuram. Thiruvananthapuram is the state capital of Kerala, and Vilappilsala is a village 22 km away. Since July 2000, Thiruvananthapuram has been transporting about 80% of the 310 tonnes per day of waste it generates to a composting plant and an adjacent dumpsite in Vilappilsala village. Since the same month, respiratory illnesses reported in Vilappil Primary Health Center increased tenfold, from an average of 450 to 5,000 cases per month. People who used to regularly swim in the village's aquifer have begun contracting infections; swarms of flies have ever since been pervasive; and a stigma of filth affected households throughout the community. This was a source of frustration as locals who, as Indians, prize the opportunity to feed and host guests, found them unwilling to even drink a glass of water in their homes. Currently, there is not a single household which has not experienced respiratory illnesses due to the waste processing plant and the adjoining dumpsite. (1)

On the other hand, Thiruvananthapuram's residents had to sneak out at night with plastic bags full of trash to dispose them behind bushes, on streets or in water bodies, and had to openly burn heaps of trash every morning for months. This was because the waste generated was not being collected by the city as it could not force open the composting plant and dumpsite against large scale protests by Vilappilsala's residents. In August 2012, about 2,500 police personnel had to accompany trucks to the waste treatment plant as they were being blocked by local residents lying down on the road, and by some, like village's President, by going on an indefinite hunger strike.

Municipal Commissioner Replaced in Karnataka

In response to a similar situation in Bengaluru, the state capital of Karnataka, where the streets were rotting with piles of garbage for months, the municipal commissioner was replaced as a result of the waste management crisis in the city. Against the will of local residents, a landfill which had been closed following the orders issued by the state's pollution control board in response to public agitation, had to be reopened soon after its closure as the city could not find a new landfill site.

Dengue Outbreak in West Bengal

Even if partially because of improper waste management, Kolkata, the state capital of West Bengal and the third biggest city in India, experienced a Dengue Fever outbreak with 550 confirmed cases and 60 deaths. This outbreak coincides with a 600% increase in dengue cases in India and 71% increase in malaria cases in Mumbai in the last five years. Rain water accumulated in non biodegradable waste littered around a city acts as a major breeding environment for mosquitoes, thus increasing the density of mosquito population and making the transmission of mosquito related diseases like dengue, yellow fever and malaria easier. (2) (3)

Rabies in Jammu & Kashmir

Rabies due to stray dog bites is responsible for more than 20,000 deaths in India every year (4). Improper waste management has caused a 1:13 stray dog to human ratio in Srinagar (compared to 1 per 31 people in Mumbai and 1 per 100 in Chennai), where 54,000 people were bitten by stray dogs in a span of 3.5 years. Municipal waste on streets and at the dumpsite is an important source of food for stray dogs. The ultimate solution to controlling stray dogs is proper waste management (5). The public has been protesting about this stray dog menace for months now with no waste management solutions in sight, but only partial short term measures like dog sterilization.

Waste Management Crisis

In light of the large scale public protests in Kerala, Karnataka, Jammu and Kashmir, and Tamil Nadu and the change of Bengaluru's municipal commissioner, the issue of improper waste management has already become political. However, local governments which are responsible for waste management will not be able to provide or implement immediate solutions. While policy gridlock ensues, public health of Indians will continue to be affected, quality of life will continue to degrade, and environmental resources will continue to be polluted.

The inability to provide immediate solutions to waste management in these cities is not the crisis; the true crisis is yet to come. Not just ten or fifteen, but there are 71 cities which generate more waste than Thiruvananthapuram (310 tonnes per day), and like Thiruvananthapuram, they have limited resources to handle it (6). During the course of the next decade, public unrest is expected to spread as these cities try to grapple with increasing quantities of waste. This will lead to a waste management crisis if government authorities do not leverage the current situation which has resulted in increased awareness to bring about long term reforms.

Twelve years since the Municipal Solid Waste (MSW) (Handling and Management) Rules 2000 were issued by the Ministry of Environment and Forests, the progress achieved is meager. As was mentioned at WTER-India's "1st International Brainstorming Workshop on Waste to Energy in India" (Workshop), no city complies with the MSW Rules 2000. Open dumping, open burning and landfill (dumpsite) fires, and open human and animal exposure to waste is common.

Improper waste management causes various environmental hazards, such as air, soil, ground and surface water pollution, odor nuisance, health hazards, impairment to natural aesthetics, and feed and support vectors like rats, dogs, mosquitoes and monkeys. Open burning of waste and landfill fires are among the largest sources of air pollution in Indian cities. In Mumbai, they contribute about *20% of air pollution* due to particulate matter, carbon monoxide and hydrocarbons. *They also emit 10,000 grams TEQ of carcinogenic dioxins/furans every year in Mumbai alone*¹ (6).

¹ **Comparison:** Open burning of waste emits 35,200 nanograms (ng) toxic equivalents (TEQ) of dioxins/furans per kilogram (kg) of waste burnt in comparison to 0.25×10^{-9} nanograms TEQ/kg combusted in 127 WTE facilities in France, which together emitted 4 grams TEQ of dioxins from the combustion of 16 million tons per year of waste (6). The difference between these sources is in the order of magnitude of 10^{14} .

Cities Have Limited Options

In the short term, municipal corporations have limited options and will not be able to deliver integrated waste management systems immediately. Municipalities face the task of realizing waste management facilities inside or near cities while none of their citizens want those facilities near their residences. Finding new landfill sites around cities is nearly impossible due to the sheer lack of space for Locally Unwanted Land Uses (LULUs) like waste management because of the population density and the scale of increasing urban sprawl in India. Officials of Hyderabad's municipal corporation have been conducting interviews with locals for about eight years now for a new landfill site, to no avail.

In spite of the mounting pressure, most corporations will not be able to close the dumpsites that they are currently using. This might not be the good news for which local residents could be waiting, but, it is important that bureaucrats, municipal officials and politicians be clear about it. Residents near Vellalore dump protested and blocked roads leading to the site because Coimbatore municipal officials repeatedly failed to fulfill their promises after every landfill fire incident.

Due to lack of existing alternatives, other than diverting waste fractionally by increasing informal recycling sector's role, closing existing landfills would mean finding new sites. Finding new landfills in and around cities is nearly impossible because of the track record of dumpsite operations and maintenance in India and the Not in My Backyard (NIMBY) phenomenon. However, the corporations can and should take measures to reduce landfill fires and open burning, and control pollution due to leachate and odor and vector nuisance. This will provide much needed relief to adjacent communities and give the corporations time to plan better. While navigating through an issue as sensitive this, it is of the utmost importance that they work closely with the community by increasing clarity and transparency.

Municipal officials at the WTERT-India workshop repeatedly stressed the issue of scarcity of land for waste disposal, which led to overflowing dumpsites and waste treatment facilities receiving more waste than what they were designed for. Most municipal officials are of the sense that a magic solution is right around the corner which will turn all of their city's waste into fuel oil or gas, or into recycled products. While such conversion is technologically possible with infinite energy and financial sources, that is not the reality. Despite cities' inability to properly manage wastes, the majority of municipal officials consider waste as "wealth" when approached by private partners. Therefore, a significant portion of officials expect royalty from private investments without sharing business risk.

Judiciary – Platform for Public Action

The Indian Judiciary proved to be the most effective platform for the public to influence government action. The majority of local and national government activity directed towards improving municipal solid waste management is the result of direct public action, funneled through High Courts in each state, and through the Supreme Court. This started as early as 1996 when a Public Interest Litigation (PIL) in the Supreme Court resulted in India drafting its first MSW (Management and Handling) Rules 2000.

In a more recent case (Nov 2012), a slew of PILs led the High Court of Karnataka to threaten to supersede its state capital Bengaluru's elected municipal council, and its dissolution, if it hinders efforts to improve waste management in the city. In this case, the Court followed up on the results of actions taken by the City based on previous court orders, and noted that people are getting restless and are unsatisfied with the City's performance. In another case in the state of Haryana, two senior officials in its urban development board faced prosecution in its High Court for dumping waste illegally near suburbs. Mumbai's municipal corporation also faces a similar prosecution from its High Court. The results of these cases almost always end up scurrying municipal officials, which

in most cases is insufficient to affect necessary change. India's strong and independent judiciary is expected to play an increasing role in waste management in the future, but it cannot bring about the required change without the aid of a thorough national policy.

Government Response and Planning

In 2005, the Government of India (GOI) responded to the challenge of solid waste management by investing \$ 510 million (INR 2,500 Crores) in Public Private Partnerships (PPPs) initiated by local governments under its Jawaharlal Nehru Urban Renewal Mission (JnNURM). (6) GOI has been encouraging PPPs to help local governments deal with the tremendous pressure on limited infrastructure caused by increasing quantities of waste. In addition to complementing the budgetary and human resources of the public sector, the inclusion of private sector in infrastructure projects increases accountability, and improves the efficiency of project management and delivery.

Apart from JnNURM, there has been no national level effort required to address the problem. Even though JnNURM was phenomenal in stimulating the industry and local governments, it was not enough to address the scale and extent of the problem because it was not a long term financing program, the sort of which are required to tackle issues like solid waste management.

Address Problems with Planning and Policies

Out of all the measures that are necessary in addressing India's impending waste management crisis, the most efficient will be changes at the national policy and planning level. It is well known among the small but growing waste management sector that urban India will suffer due to improper waste management. Unfortunately, they think that such a crisis is required to bring about policy changes; as such changes generally tend to happen only after the damage has been done. This attitude is unfortunate because it indicates a lack of or failed effort from the sector to change policy and it reflects poorly on the level of India's planning and preparedness.

It is expected that an average of 32,000 people² will be added to urban India every day during the next decade through 2021. This number is a warning, considering how India's waste management infrastructure failed to cope with just 25,000 new urban Indians during the last decade. The scale of urbanization in India and around the world is unprecedented resulting in planetary consequences to Earth's limited material and energy resources, and its natural balance. The rate of increase in access to sanitation infrastructure generally lags behind the rate of urbanization by 33% around the world; however, the lack of planning and impromptu piecemeal responses to waste management issues observed in India might indicate a much wider gap. This means urban Indians will have to wait longer than an average urban citizen of our world for access to proper waste management infrastructure.

The clear trend in the outbreak of epidemic and public protests around India is that they are happening in the biggest cities in their respective regions. Kolkata, Bengaluru, Thiruvananthapuram, and Srinagar are capitals of their respective states, and Coimbatore is the second largest city in Tamil Nadu. However, long term national level plans to improve waste management in India do not exist and guidance offered to urban local bodies is meager.

Researchers Are Required

Research which can be directly applied to India's situation is minimal, mainly because there is a lack of funding and attention to waste management as an issue. Most existing *research is focused on just one aspect* of waste management – organic waste decomposition using biological processes. Consequently, India is one of the largest users of small scale anaerobic digestion (biogas) units in

² Assuming an urban population growth rate of 31.8%, same as that during the last decade: 2001-2011

the world and the most widely employed waste management technique in India is aerobic digestion (windrow composting). However, research required in India to address the challenges it faces ranges from environmental life cycle analysis to economic analysis of various waste management options for Indian cities, from public health impacts across India to policy and social aspects.

Responsible Industry Practices Are Needed

The Solid Waste Management (SWM) industry in India is young and growing, with a significant influx of new players from other sectors. Most of the industry is currently involved in collection, transportation, landfill and mechanical biological treatment contracts. In the next three years, it is expected that India will have more than 9 new WTE plants in Mumbai (1), Thane (1), Cochin (1), Hyderabad (2), Chennai (2), and New Delhi (2 more). This is a big number considering that there have been no new WTE facilities constructed in the U.S. in the last 15 years, while it still landfills more than 50% of its waste.

The influx of new players and a limited number of tenders has resulted in cut throat competition leading companies to quote extremely low in order to win contracts. Such bidding results in bad projects, which will take the entire industry backwards with every failed project. Such financial mismanagement is one of the most recurrent reasons for waste management project failures worldwide.

Reason for Hope

While the situation across India is grim and official action has to be demanded through courts or public protests, there are a handful of local governments which are planning ahead and leading the way. The steps taken to solve New Delhi's waste management problem is laudable. If it was not for the kind of leadership and determination showcased in Delhi, India would not have had its only operating WTE plant. This plant was built in 2011, at a time when the need for WTE plants was being felt all over India. 1300 tons of Delhi's waste goes into this facility every day to generate electricity. The successful operation of this facility reinvigorated dormant projects across the nation.

After living with heaps of garbage for months, Thiruvananthapuram Municipal Corporation started penalizing institutions which dump their waste openly. It has also increased the subsidy on the cost of small scale biogas units to 75% and aerobic composting units to 90% to encourage decentralized waste management. The corporation is optimistic with the increase in number of applications for the subsidy from 10 in an entire year to 18 in just a few months after the announcement.

In Bengaluru, improper waste management led to the change of the city's municipal commissioner. The new commissioner was handed over the job to particularly improve waste management in the city. As a response to the dengue outbreak in Kolkata, the state's Chief Minister went door to door to create awareness about waste management, and also included the topic in her public speeches. For good or bad, many cities in India have started or initiated steps for banning plastics without performing life cycle analyses.

What Next?

It was clear to everyone that integrated waste management is the goal India should strive towards. Integrated waste management is the coordinated use of a strategically chosen set of waste management options each of which play specific roles in prevention and reduction of waste and its transportation, and in material and energy recovery from wastes towards achieving maximum resource efficiency (7) (more information at [link 1](#), [link 2](#)). It is now important that we discuss the time period required to achieve significant results and local applicability of various technologies as part of an integrated system. In addition to discussing what *should* be done and the ideal state of waste management in a country, we should also examine achievable goals, and the incremental steps that *can* and *should* be taken to achieve those goals.

The President of Vilappilsala Panchayat withdrew fasting. This was not the first time an Indian attempted to achieve something through a public hunger strike, but, it indicates the beginning of a new age of public action for better waste management and environmental justice, and the severity of its impact on citizens' lives.

Experts believe India will have more than nine WTE projects in different cities across India in the next three years, which will help alleviate the situation to a great extent. However, since waste to energy combustion projects are designed to replace landfills, they also tend to displace informal settlements on the landfills. Here, governments should welcome discussions with local communities and harbor the informal recycling community by integrating it into the overall waste management system to make sure they do not lose their rights for the rest of the city's residents. This is important from a utilitarian perspective too, because in case of emergency situations like those in Bengaluru, Kerala, and elsewhere, the informal recycling community might be the only existing tool to mitigate damage due to improper waste management as opposed to infrastructure projects which take more than one year for completion and public awareness programs which take decades to show significant results.

Indian policy makers and municipal officials should utilize this opportunity, created by improper waste management examples across India, to make adjustments to the existing MSW Rules 2000, and design a concrete national policy based on public needs and backed by science. If this chance passes without a strong national framework to improve waste management, the conditions in today's Bengaluru, Thiruvananthapuram, Kolkata, Mumbai, Chennai, Coimbatore and Srinagar will arise in many more cities as various forcing factors converge. This is what will lead to a waste management crisis affecting large populations of urban Indians.

The impending waste management crisis in India should be approached holistically; while planning for long term solutions, focus on addressing the immediate problems should be maintained. National and local governments should work with their partners to promote source separation, achieve higher percentages of recycling and produce high quality compost from organics. While this is being achieved and recycling is increased, provisions should be made to handle the non-recyclable wastes that are being generated and will continue to be generated in the future. (6)

Recycling, composting and waste-to-energy are all integral parts of the waste disposal solution and they are complementary to each other; none of them can solve India's waste crisis alone. Any technology should be considered as a means to address public priorities, but not as an end goal in itself. Finally, discussion on waste management should consider what technology can be used, to what extent in solving the bigger problem and within what timeframe.

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