

# **Integrated Solid Waste Management Programme – A sustained and perennial solution**

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## **Abstract**

Save Bombay Committee (SBC) has been involved in taking up issues of social and environmental concern and trying to give solutions that are practical and sustainable. The management of solid waste in a city like Mumbai with an area of 434sq.km. and an ever-exploding population of 16 million plus, has failed and the city has been suffering the stink and filth. Technology coupled with increasing finances expended on waste management have proved useless beyond doubt making the city look more and more dirty over recent times. Since 1984, SBC has been instrumental in trying to give suggestions and programs in improving the situation but the response from the concerned authorities and the civic society in general has been poor. However in 1994, SBC took up a specific study about the problem and in 1996, we came out with a unique, concrete and sustainable solution for not only cleaning Mumbai but also serving as a panacea to be replicated the world over.

Integrated Solid Waste Management Programme (ISWMP) based on citizen perceptions and civic demands was the result of the study giving a permanent and logical alternative to the society. ISWMP based on “cradle to grave” approach and the 3R principle of Reduce, Reuse and Recycle aims at attaining highest quality of cleanliness on a permanent and sustained basis taking into account the ecological and economical aspects associated with the functioning of the system as a whole.

The ISWMP provides an opportunity for live partnership between the government and the people. Approximately 300,000 citizens are already practising the ISWMP. The SBC worked out models of partnerships between the authority and citizens and helped the Municipal Corporation of Greater Mumbai (MCGM) as a consultant for three years in finalising work plans for creating and sustaining partnerships involving citizens in improving conditions in their areas. The MCGM designated the partnerships as Advanced Locality Management (ALM). The Government of India has laid down norms for handling Municipal waste, medical waste, and toxic industrial waste on the basis of ISWMP.

## **1 Introduction**

Disposal of solid waste is becoming a serious and vexing problem for any human habitation all over the world. More advanced the human settlements, more complex the waste management. There is a continuous search for sound solutions for this problem but

it is increasingly realised that solutions based on technological advances without human intervention cannot sustain for long and it in turn results in complicating the matters further. For the authorities, usually municipal, obligated to handle solid waste generated within their respective boundaries, the usual practice followed is of lifting solid waste from the point of generation and hauling to distant places known as dumping grounds and/or landfill sites for discarding. The treatment given to waste once thus emptied is restricted to spreading the heap over larger space so as to take away the waste from the public gaze.

Even the landfill, sometimes described as 'sanitary landfill', does not go beyond filling up of low-lying areas with stinking waste conveniently bypassing the recommended requirements for 'sanitary landfill'. In the end, anything that is emptied at dumping or landfill sites continues to cause serious environmental depredation.

Dumped mixed waste continuously generates methane and toxic greenhouse gases, forming into suffocating cloud over habitat areas adversely affecting human health. Accidental ignition creates spontaneous fires at the dumping grounds difficult to extinguish or control.

Simple dumping of mixed waste is the practice followed practically everywhere and especially in the developing countries as they cannot mobilise financial resources for applying expensive technology propounded by the developed countries.

The developed countries do boast that they handle their waste in a more scientific manner at landfill sites by laying the dumping grounds with a vulcanised plastic sheet to avoid leaching of toxic digested and undigested waste into the ground underneath. This sanitary landfill system, elaborately described in textbooks and highly recommended by the World Health Organization, is rarely followed and the impact of slipshod working on the soil underneath or on aquifers has not been documented or presented to the community. Authorities practicing landfill do declare that they assiduously implement requirements for recommended landfill to assuage citizen concern.

It is however obvious that any untreated waste would definitely culminate into a health and environmental hazard at some point of time. Dumping of untreated mixed waste can be taken as a time bomb or a series of time bombs bound to explode adversely affecting the living beings and the environment. Communities residing within two to three km of the dumping sites are observed to have 25% higher incidence of cardio-vascular and lung diseases. Global scenario shows as to how countries after countries are experiencing insurmountable problems in dumping solid waste and how they are in constant search for newer sites for dumping their daily increasing quantum of waste.

Despite the observation everywhere that space is a scarce commodity in human centres and it is practically impossible to find large areas for dumping of wastes, municipalities keep demanding more and more spaces causing serious strain. When they fail to find space within their own boundaries, municipalities try for land outside and quite often

obtain extraterritorial rights or rather license to dump putting neighbouring communities to unanticipated hardship.

Cases of lands located as far as 200 km away for dumping exist in the USA. However one can imagine the predicament in densely populated countries where availability of land has become a controversial issue for the government and residents. Also, unscientific dumping pollutes underground water systems in adjoining areas. It also poses immense health problems to people living in the vicinity. Studies have revealed that sizeable percentage of low-income level strata of the society are forced to reside in the vicinity of these far-off dumps, tolerating the inhuman conditions, faced with severe land availability crunch.

The developed countries invented incinerator to burn waste so as to remove it from the eyesight. Earlier regarded as a panacea for managing the mounting quantum of waste this sophisticated technology has now been found to be a well-established serious hazard both to the environment and public health. Concerned citizens, the world over, are persistently agitating against setting up of new incinerator plants as well as for closing down existing facilities.

The experience everywhere is that more sophisticated the human settlements, more complex the waste disposal. There is a continuous search for sound solutions however it is increasingly realised that solutions based on technology not backed by human involvement cannot sustain for long and result in complicating matters further.

The city of Mumbai, with an exploding population of 12 million plus, too has similar problems of waste disposal and the citizens were the ones to suffer the daily stink. Exasperated by the casual working of the municipality, citizens on their own initiated cleanliness activities in their neighbourhoods. However these initiatives were like a drop in the ocean and did not impact as such on changing the scenario of the city. The municipal authorities on the other hand were hunting for newer spaces for dumping and also wanting to introduce processing projects hazardous to the community at unprecedented public cost.

The Save Bombay Committee (SBC) has since 1973 been taking up issues of social and environmental concern and developing with active citizen participation practical and sustainable solutions. The SBC in collaboration with leading environmental and consumer groups took up an in-depth study of the issue of solid waste management and came out with an economically viable and environmentally sustainable solution 'Integrated Solid Waste Management Programme' for cleaning up Bombay, since renamed as Mumbai.

## **2 Materials and Methods**

Mumbai, with a population of 16 million inhabiting in an area of around 434 square km, generates 12000 tons plus of solid waste a day. MCGM statutorily obligated to abate

nuisance and pollution within its boundary is required to handle solid waste generated daily to maintain minimum level of public health in this city with a population density of 27,000 persons per square km, the highest in the world for any human settlement. The Solid Waste Management Department of the MCGM lifts the waste from crowded habitats and hauls to four dumping grounds located at safe distance away from the areas where politicians and the rich frequent. Incidence of cardio-vascular disease is very high in areas up to 2 km radius of the dumping yards. About 25% of Mumbai's residents stay in slums around this area. About 3.5 billion INR, which is about 15% of the MCGM's annual revenue income, is spent on the operations of the Solid Waste Management (SWM) Department. In spite of this large spending, Mumbai still remains a filthy city with heaps of waste lying everywhere.

Residents throw waste in the mixed condition in the ever-overflowing waste bins, from where the SWM department workers lift for depositing in the rickety trucks. Trucks haul waste to dumping grounds generating nauseating stink all along the route. Waste is emptied at the dumping grounds and evenly spread over larger area and then left to nature to look after. Fires are a continuous affair. The MCGM is constantly on watch for more land as existing dumping grounds are getting filled up. Having filled up all the low-lying areas with stinking waste, the MCGM is eyeing suitable chinks of land outside its boundaries as if to create unhealthy conditions in neighbouring centres.

Integrated Solid Waste Management Programme (ISWMP) involving active citizen participation is the result of the SBC study giving a permanent and logical alternative to the existing practice. The ISWMP based on the 'cradle to grave' approach and the 3R's – Reduce, Reuse and Recycle' concept aims at attaining highest quality of cleanliness on a permanent and sustained basis taking into account the ecological and economical aspects associated with the functioning of the system as a whole.

The SBC study showed that Mumbai's solid waste comprises predominantly of 3 components: biodegradable organic or wet waste, recyclable or dry waste and rejected building materials or inert waste in the ratio of 55:10:35 respectively. Every component needs entirely different and component specific treatment to create "zero garbage" condition. The debris is generated not on a day-to-day basis and therefore its management is not a problem for residents.

The ISWMP recommends segregation of waste on the basis of three major components at the point of generation to be taken up by the generator. The recyclable component is further segregated in paper, plastic, rags, glass etc.

The emphasis in the ISWMP is on treating each and every component of the solid waste while leaving nothing as discards. The ISWMP recommends treating each and every component of this solid waste especially the wet and the dry component so that it is brought back for reuse directly or after recycling by the community.

Organic waste can be returned to the soil as soil conditioner/ manure through vermiculture. Vermiculture is a simple process that any generator of waste can fully

apply for turning organic component into soil conditioner. Vermiprocessing can be undertaken by every single household as conveniently and easily as it can be applied to a facility set up for waste for thousand households. Resident associations can set up central vermiculture facilities for handling their waste and utilising soil conditioner for greening of the neighbourhoods. The object is to avoid hauling of waste away from the generation point.

Practically every item of dry or recyclable component can be brought back to reuse directly or after recycling. We throw away dry component originally made from our finite natural resources creating serious environmental pollution. Instead they can be diverted to the market for reuse. Every society has a substantial population of rag pickers, the poorest of the poor in the community who are always on hunt for activities that can provide food for sustenance. Rag pickers form about 3% of Mumbai's population. They pick up these components from our waste bins and dumping yards. Residents can instead hand over segregated dry components directly to rag pickers for diverting to the market for recycling. Vermiculture of wet waste and diverting of dry waste to market directly or through rag pickers will take care of major portion of the MSW and residents, who are after all the generators of waste, can easily handle that activity.

Rejected building material, the third major component, is inert. Hence municipal bodies can deposit it in a designated site to create a hill of 25 to 100 meter height in next 10 to 25 years to be covered with soil conditioner retrieved from wet waste. This hillock can then be landscaped with greenery to create for the community a loveable picnic spot in the otherwise monotonous city.

### **3 Employment opportunities to the lowest strata of the society**

Most of the rag-pickers in cities are developing world are migrants from rural areas. They face two challenges: surviving poverty and living with respectability. Working independently, they do not gain the respectability they deserve. Many view them with suspicion. Often, they scavenge for recyclable waste in Municipal dumps. But becoming part of ISWMP gives them a sense of identity as they can now collect wastes from individual households. This sense of respectability is a major incentive for the rag-pickers to participate in ISWMP.

### **4 Results and Discussions**

The SBC presented the ISWMP to the MCGM and residents simultaneously. The Municipal Commissioner announced in public that the MCGM would implement the ISWMP in stages with resident support. Residents saw in the ISWMP an opportunity to bring about cleanliness in their neighbourhoods. They formed resident associations to set up neighbourhood vermiculture facilities. Rag pickers readily helped residents in managing their own waste within their premises and got in return recyclable component of waste from residents. Recyclable waste was diverted to market for reuse and recycling.

The MCGM set up vermiculture facilities within the dumping grounds with the help of rag pickers to handle waste from bulk generators like markets places and similar such sources.

For the first time, a hope that solid waste can be managed environmentally was generated amongst the residents. The SBC approached the State of Maharashtra, of which Mumbai is the capital and the Central Government to direct all municipalities to devise waste management practices on the lines recommended in the ISWMP. The Central Government laid down norms for managing solid waste on environmentally acceptable lines. Municipalities are slowly discarding their erstwhile practices of dumping waste to sustainable practices. Leading industries and large business houses are taking up the ISWMP for handling their waste.

SBC would be happy to assist any human settlement in setting up this pragmatic program.

## **5 Conclusion**

In a nutshell the ISWMP ensures the following benefits:

- Reduction in the quantum of waste
- Saving in overall cost on management
- Creation of zero waste condition in communities through 100% reutilization of what was discarded once as waste
- Conservation of finite natural resources
- Protection of environment
- Low capital investment
- Creation of jobs for the poorest of the poor
- Sustained clean surroundings
- Improvement in the quality of life through better health conditions
- Easily replicable and simple to implement and operate

## **References**

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