

Help solve waste crisis (in Sri Lanka)!

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That our country (Sri Lanka) is gradually getting buried in a waste crisis is no news. However, the vast extent of its adverse effects is news to many as the crisis is affecting our environment, people and economy, slowly “poisoning” our country. Even “more news” is, however, the decisive role we all have to play as individuals in solving this crisis.

Based on a discussion with Professor Ajith de Alwis (Head, Department of Chemical & Process Engineering, University of Moratuwa, Sri Lanka, www.mrt.ac.lk), this article looks at the solid waste generated in Sri Lanka, draws attention to the causes of the crisis, highlights its adverse effects, and briefly discusses the options available to solve it. Subsequent articles will explore in more detail the crisis and options for solving it – hopefully!

Wherever we are, we produce waste

Houses, businesses, industries, institutions, hospitals, construction sites, agriculture land, and even on the road! No matter where we are, we all produce waste. We produce solid waste, wastewater and sewage and generate hazardous wastes as well.

As solid waste, we produce:

- Residential waste (e.g., food waste, paper & cardboard, yard waste, plastics, glass, metals, wood, textiles) at houses
- Commercial waste (e.g., Food waste, paper & cardboard, plastics, glass, metals, wood) at shops, restaurants, hotels, offices, markets, service stations & garages
- Institutional waste (e.g., Food waste, paper & cardboard, plastics, glass, metals, wood) at schools & universities, government institutions
- Clinical wastes (e.g., Human tissues, sharps, pathology and laboratory wastes, pharmaceutical wastes, disposable containers for urine and body fluids, low level radioactive wastes, disposable medical materials such as contaminated aprons, gloves) at hospitals, medical laboratories, drugs manufacturers & suppliers
- Construction & demolition wastes (e.g., concrete, bricks, steel, wood, dirt) at

building construction sites, road repair & construction

- Municipal services wastes (e.g., litter, sweepings, debris) from street cleaning, landscaping
- Treatment plant wastes (e.g., effluent and residual sludge) at water and wastewater treatment plants and industrial treatment processes
- Industrial wastes (e.g., industrial process wastes, ceramics, waste oil, plastics) at manufacturing, fabrication and timber, refineries, chemical plants and power stations
- Agricultural wastes (e.g., food wastes, rice husk) at paddy fields, dairies and farms

In Sri Lanka, the amount of solid waste we generate every day is estimated to be nearly 2500 tons, amounting to over 910,000 tons a year. And we all contribute to this massive heap of waste. Each year, directly or indirectly, you produce 50kg of solid waste, and so do I! Another 50kg! Normally, it is said if you are living in a city in Sri Lanka that you are producing between 0.75-1 kg of waste per day.

If you live in the Western province, you are even more responsible as over half of the country's waste is generated in the Western province. In this province, everyone produces 90kg of waste every year!

Hazardous and toxic waste, the most dangerous of all

Among the waste we generate are hazardous and toxic wastes, which are quite dangerous and potentially harmful to human health and the environment. Therefore, hazardous wastes require safe handling and disposal. As individuals with increasingly complex lifestyles, we are going to make use of more and more hazardous materials (computers and mobile phones, solvents, cleaning fluids etc.), paving the way for more and more hazardous wastes.

Some of the characteristics of hazardous wastes can be illustrated as follows:

- Under certain conditions, wastes such as waste oils and used solvents can create fire, sometimes on their own

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- Acids and bases (e.g., battery acid) can corrode metal containers such as storage tanks, drums, and barrels
- Wastes such as lithium sulfur batteries and explosives can be unstable under “normal” conditions and can cause explosions, toxic fumes, gases or vapors when heated, compressed or mixed with water
- Toxic waste such as wastes containing mercury or lead are harmful or fatal when ingested or absorbed. (Both tube lights and CFL's contain mercury, so think how you dispose of your bulbs!)

In Sri Lanka, the amount of hazardous waste generated in 2003 is estimated to be over 57,000 tons. In other words, that year, each of us produced about three kilograms of this dangerous stuff! With economic growth, this amount is sharply increasing. Although hazardous waste generation is not comparatively excessive, the facilities they require for safe disposal are matters for serious concern

Hazardous wastes comprise byproducts of manufacturing processes or simply discarded commercial products such as cleaning fluids and pesticides or wastes from hospitals and medical laboratories. Although the main sources of hazardous wastes are industries and medical establishments, other sources such as houses, businesses and institutions can also generate hazardous waste.

Among the major industrial sources of hazardous wastes are tanneries, paint and pigment industries, metal finishing industries, battery and fluorescent lamp industries. They generate a variety of hazardous wastes, comprising:

- Inorganic wastes (e.g., inorganic acids and alkalis, zinc bearing wastes, heavy metal wastes, waste treatment sludge)
- Organic wastes such as oil wastes (liquid and semi-solid), solvent wastes, waste paints, lacquers and varnish, waste agro chemicals, waste pharmaceuticals, wood preservative wastes,
- Other wastes such as asbestos wastes, plastic, resin wastes and oil wastes from motor vehicles

Hazardous wastes from medical sources such as hospitals include human tissues, pathology and laboratory wastes and pharmaceutical wastes. Today, the number of veterinary clinics is also increasing and almost all these have no proper waste disposal mechanism.

Hazardous wastes generated at houses include adhesives, asbestos, household cleaners, insecticides, paints, paint thinners, outdated or unused medicines, used tyres, car batteries and single-use batteries. E-wastes such as waste computers, mobile phones and televisions are also hazardous wastes.

All types of hazardous wastes require safe and careful handling and management in order to prevent any adverse effect on people and the environment.

Why we face a waste crisis?

Waste crisis we face is not a natural one. We have created it and unashamedly continue to nurture it. Among its causes are the following:

- We produce more and more waste as time goes on
- We harbour undesirable attitudes and wrong thinking
- We lack proper waste collection systems
- We dump waste at environmentally sensitive locations
- We don't adopt safe technologies for hazardous waste management
- We have neglected intelligent waste management options

Now don't you think that the crisis is due to our own (in)actions?

Firstly, we produce more and more waste as time goes on. Our population is growing and the amount of waste each of us is generating is also increasing due to technological development and modernization of our lifestyle. The modern lifestyle in particular generates more waste, especially packaging material wastes such as plastics. Our passion for using the most up-to-date gadgets is also leading the way to a throwaway culture. Although we copied it from the West, they are now moving away from such bad habits, which are proving to be both economically and environmentally problematic.

Secondly, we harbor undesirable attitudes and wrong thinking. In the recent years, we have “fallen in love” with products in fancy, usually non-degradable packaging material introduced for boosting sales. Such material heavily contributes to fattening our waste dumps.

We throw away waste anywhere – except in our garden, of course! That's our habit, a bad one that has fueled the waste crisis to alarming levels.

Worse still, we think that waste management is entirely a responsibility of the authorities. To a certain extent, yes. But authorities need our support. After all it's our waste and we have a responsibility to help with its management. It's you, I and the local authority that make up the team. We have got to think along this line.

Thirdly, we lack proper waste collection systems. There is no coordinated system of waste collection in the country. We dump our waste virtually everywhere. So it is difficult for the authorities to collect waste properly. Moreover, authorities lack an adequate quantity of waste collection trucks and equipment because they are expensive.

Fourthly, we dump waste at environmentally sensitive locations. The major share of waste is generated in urban areas, where finding suitable sites for waste disposal is not easy. So authorities usually dump waste in areas away from residential neighborhoods to avoid protests from residents. As a result, waste dumps are located in environmentally sensitive locations such as riverbanks and wetlands – away from communities. But at the receiving end is the environment, and eventually the society in general.

Such waste disposal sites are unsanitary open dumps, paving the way for adverse impacts such as offensive odour, pollution of groundwater and contamination of wells in the neighborhood. Usually, these open dumpsites are not monitored and managed for control of pollution. Due to cost incurred, rarely the waste is provided with a soil cover.

Fifthly we don't adopt safe technologies for hazardous waste management. Hazardous industrial and clinical wastes require safe technologies to prevent damage to the environment and people. Because these technologies are expensive and sometimes inaccessible, we use inappropriate methods for hazardous waste management. Although some industries have onsite dumping facilities for hazardous waste, they are usually poorly managed and consequently lead to pollution in the neighborhood.

Industries tend to dispose of hazardous wastes with other municipal wastes, which will eventually find their way to open dumpsites. Such practice is extremely dangerous as it can cause severe damage to the environment and put in danger the lives of people who unknowingly come into contact with them. Poor people who handle municipal garbage

usually sans the necessary safety gear and the residents around the dumpsite area are in great danger. Moreover, some industries, usually old ones, discharge their effluents, which are hazardous, into waterways with little or no treatment.

Although several hospitals have incinerators to burn clinical wastes, there looms a massive question mark on the effectiveness of some of them. Partial combustion in incinerators can create even more harmful outputs than the hazardous waste. For example, inadequate combustion of plastics (there are more PVC in medical polymer products) in incinerators can give out dioxins, which are much more dangerous than mere plastic. The hospitals without incinerators dump hazardous clinical waste with municipal waste in open dumps operated by local authorities.

Finally, we have neglected intelligent waste management options. "Waste is raw materials at the wrong place," goes the popular saying. Wastes are, in fact, resources we fail to utilize. And fattening waste dumps reflect our Nation's inefficiency. An efficient Nation would have utilized much of this raw material and there would hardly be anything left to build up as waste.

We are used to throw away potential raw material branding it as "waste". When properly managed, what we call "waste" will create not problems but value. There is beauty, utility, energy and money in what we perceive as "waste". We can extract value out of waste by reusing, recycling, and recovering energy and minerals.

We throw away lots of plastics, which can be used for energy generation. Compare the calorific values of plastics (37,000 kJ/kg) with conventional fuels such as coal (30,000) and wood (16,000). We must also remember that plastic comes from crude oil, which sports a skyrocketing price. Can we really afford to throw away such a valuable raw material? However, our normal collected garbage lacks the required calorific value to support incineration and we should therefore not attempt burning such waste.

We throw away a lot of paper, too. However, recycling one ton of office paper can save 17 trees. Recycled paper also saves energy as it takes 60% less energy to manufacture paper from recycled stock than from virgin materials. So, one ton can save 4200kW of electricity. Recycling paper can also save water as it

uses 15% less water than making paper using virgin materials. So, one ton saves 7000 gallons of water.

In waste management, a rule of thumb is that every ton of garbage at the consumer end also required the production of 5 tons of waste at the manufacturing stage and 20 tons of waste at the site of initial resource extraction. So, by using a ton of waste at consumer end (by way of recycling for example), we can prevent generation of 5 tons of waste at the manufacturing end and about 20 tons at the resource extraction stage. So by reusing waste at consumer end, we can reduce upstream waste generation by significant amounts.

Ours is a developing country and we cannot afford to throw material away like that. Even developed countries cannot afford to dispose material as we do. Perhaps we should learn from them to find uses for the things we throw away. For example, in the USA, waste tires fuel a power plant in Westling, California; old bicycle tubes are used for making clothes in San Francisco; and waste glass is used for road surfacing in New York. Some just build entire homes from recyclables – more of that later.

Problems we face, thanks to the waste crisis

The waste crisis continues to threaten our environment, our people and our economy. Among environmental and social problems are pollution, threat to the existence of flora and fauna, overexploitation of natural resources, diseases outbreaks such as dengue and health problems and even fatalities. Prominent among economic problems are waste of reusable material, loss of potential foreign investment and negative effect on tourism.

The adverse effects of the waste crisis on the environment and people have led to environmental degradation and health problems, sometimes even fatalities.

Currently in Sri Lanka, we either dispose of waste in landfills or dumpsites or burn waste in uncontrolled condition, usually in open air. These are not safe methods and therefore have created environmental and social problems.

Open dumpsites are usually located on low-lying land, such as marshy land or paddy fields, resulting in several environmental

problems. They reduce the area's drainage and flood control capacity, ushering flash floods on a regular basis. They rob wetland habitats for wildlife and cause loss of productivity in the case of paddy lands.

As wastes decompose in open dumpsites and improperly managed landfills, moisture filters through them producing a toxic liquid known as leachate. Such leachate leads to groundwater and surface water pollution, eventually creating serious health problems as well. Decomposing wastes also contribute to Global Warming because they produce two greenhouse gases, namely carbon dioxide and methane. Methane is twenty times more potent as a greenhouse gas than carbon dioxide. It is the inhibited methane production in this manner that is the problem.

Open dumpsites and unsanitary landfills generate an unpleasant odor due to anaerobic decomposition of waste. Flies, other disease bearing insects and scavenging animals that proliferate at these sites pose further health hazards to nearby communities. Water logging in wastes such as used tyres fuels disease outbreaks such as dengue.

Both open dumpsites and improperly managed landfills also adversely affect the aesthetic view.

Uncontrolled burning of waste in open air or burning waste in plants without adequate emissions control systems cause air pollution. Such polluted air can choke up our lungs and shorten our life span. We only have to speak to a pathologist who has done an autopsy to get the difference.

Secondly, the waste crisis has generated several problems in the economic front as well. They include:

- We lose potential foreign investment
- Our tourism industry is negatively affected
- Land value around polluted areas drops
- Our country's healthcare expenditure goes up
- National productivity falls

Infrastructure for proper waste disposal, especially for hazardous industrial wastes, is a key area that reputed foreign investors look for before deciding to invest in a country. Lack of such disposal facilities in our country creates a negative image on the country among the investor community. Discouraged investors are likely to invest in another country where such infrastructure is in place, making our

country lose badly needed foreign investment. In certain instances the type of investments we get are best avoided.

In our country, tourism is a major industry that earns foreign exchange. But this industry's future is under threat. Who would like to visit a polluted country to spend their precious days of leisure, looking at garbage and inhaling toxic fumes? What is at times sad is that hotels themselves are responsible for waste elsewhere.

Land around open dumpsites suffers from pollution and unpleasing appearance, consequently losing their value. Who would want to work or live in a polluted area?

Open dumpsites and unsanitary landfills can pollute neighborhoods, creating health problems. As a result, the health authorities are compelled to spend money to counter disease outbreaks and to treat victims of waste-crisis pollution. If not for the waste crisis, such money could have been more usefully spent in the interest of us all.

In the twenty first century, a society that is displaying its incapability to handle its own waste is perhaps a 'failed society', no matter how we may describe ourselves to be. The visible signs of mass ignorance of the society will speak for itself. Do we want to be members of a "failed society"?

How can we solve the waste crisis?

Proper solid waste management is essential for solving the environmental, social and economic problems created by the current haphazard waste disposal practices.

Solid waste should not merely be disposed of. It can be made useful through reuse or recycling, for example, creating value out of it. What we should focus on is waste management, not merely waste disposal, which is only a minor component of waste management. Only when waste cannot be made useful should it be disposed of – safely (i.e. without causing danger to people or the environment). In other words, disposal should be the final resort.

When it comes to waste management, there is no one single solution. We should formulate an integrated solution through intelligent choices. The following guide is based on the widely known "waste management hierarchy":

- Firstly, try to avoid waste or at least reduce waste at source
- Recycle waste materials if avoidance or reduction is impractical or impossible (e.g., recycling, composting)
- Recover energy and/ or minerals from industrial waste if recycling is impractical or impossible (e.g., co-processing, biogas technology)
- Dispose of the waste only if all the above options are impractical or impossible (e.g., sanitary landfills, incineration)

Our contribution is a must!

If we want to find a lasting solution to the country's waste crisis, we must not fool ourselves in believing that authorities alone can do the job. They can't. In avoiding or reducing wastes, for example, we as individuals can play a pivotal role. Moreover, for options such as recycling and co-processing, waste collection should be classified at source into organic wastes, plastics, glass, paper and so on. For this, authorities will heavily depend on individuals. That's how developed countries engage in successful waste management.

As citizens of Sri Lanka, we must change our attitude and try to understand the crisis. Knowledge is vital in managing any crisis and waste crisis is no exception. Let's unite to help the country to solve the waste crisis, and let's save ourselves as well as the generations to come!

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