

## Landfilling and Environmental problems in Sri Lanka (with reference to Gampaha District)

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### Abstract

*Inevitable consequences of the practice of solid waste disposal in landfills are gas and leachate generation due primarily to microbial decomposition, climatic conditions, refuse characteristics and nature of landfilling operations. The diffusion of gas and leachate away from the landfill boundaries and their release into the surrounding environment present serious environmental concerns at both existing and new facilities. The problem of this study is there any impact of landfilling on environment in Sri Lanka. The objectives of this study are to identify the reasons for environmental problems, identify the environmental problems created due to landfilling and identify the solutions for overcome or mitigating the environmental problems due to landfilling in Sri Lanka. Besides potential health hazards, these concerns include, and are not limited to, fires and explosions, vegetation damage, unpleasant odors, landfill settlement, ground water pollution, air pollution and global warming. Managing waste could be a grave issue for a newly developing country such as Sri Lanka. Lack of a proper waste management system and irregular garbage dumping practices have not only created an unpleasant atmosphere but the sanitary issues that may lead to instances of public unrest and tensed situations. Following the recent experiences of the turmoil caused by civil unrest due to a polluted water problem that claimed lives, the need to establish a suitable waste disposal system is immensely felt. A wide extent of land excavated into a pit which is called a cell, laid with layers of different material to protect the soil from pollution and extract the waste water separately, has a capacity to hold an estimated 20, 000 metric tons of solid waste within a targeted period of 10 to 15 years by the time the landfill is completed. It is expected to be handed over to the public as a recreational ground when the landfill is complete. Located in a remote forest land near the Kirindiwela town, the site will provide a state-of-the-art garbage dumping ground for residual waste collected within the DompePradeshiya Sabha area. The project will come as a solution to the unregulated, open dumping of solid waste by local authorities and will be the first sanitary fill to be used with modern technology to avoid pollution of soil, ground water and waterways in the surrounding area. The project will come as a solution to the unregulated, open dumping of solid waste by local authorities and will be the first sanitary fill to be used with modern technology to avoid pollution of soil, ground water and waterways in the surrounding area. This study has been used both primary and secondary data. Primary data was collected from five hundred samples in Gampaha district by using interview schedule and observation method. Secondary data was collected from secondary various sources. Data was analyzed by using statistical methods like graphs, tables, percentage etc. According to collected data those living near landfill sites it were found that households use well water for drinking and cooking purposes, bathing and washing of clothes and vehicles and for gardening purposes. However, the number of households using well water is significantly less amount in residences very close to the landfill. The usage of well water increases with the distance to the landfill. It is an indication that although wells are available in households close to landfill areas residents are hesitates to use them. However, since most of the householders use well water in the area can be seen a serious problem of ground water pollution. Other problems were odor, flood in rainy season reducing land value, breeding grounds for mosquitos, worms and various insects, create smoke and poisonous gases giving rise to safety problems, Children affected by various diseases such as skin diseases, and unbalance the bio-diversity in the area. The responsibility of government, NGOs and policy making bodies are to take necessary actions to control the problem of land filling on environment by hazards waste in Sri Lanka.*

**Key words:** Landfilling and environmental impact

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## **Introduction**

Landfills have led to some of the most heated, acrimonious battles over pollution in the public commons that have ever been seen. While there are a number of reasons for the vehement arguments that often surround landfills, one of the largest is the juxtaposition of both the understood need for landfills and the lack of will to live near one. According to the various researches, the average person dumps almost 4.5 pounds of waste into landfills every single day. With the population skyrocketing across the country, these landfills will only become more of a public issue as time goes on. Despite the arguments over landfills in general, there are no arguments over the assertion that there are many things that contribute to the environmental problem of landfills.

This paper examines how Landfills have led to some of the most heated, acrimonious battles over pollution in the public commons that have ever been seen. While there are a number of reasons for the vehement arguments that often surround landfills, one of the largest is the juxtaposition of both the understood need for landfills and the lack of will to live near one. The environmental problems caused by landfills are numerous. While there are many problems with landfills, the negative effects are most commonly placed into two distinct categories: atmospheric effects and hydrological effects. While these effects are both of equal importance, the specific factors that drive them are important to understand on an individual basis. The objectives of this study is to identify the critical factors for land filling, identify the impact of land filling on environment and identify the solutions to mitigate the problem of environment due land filling in Sri Lanka.

## **Introduction to study area**

Gampaha is the District Capital of Gampaha District in the Western Province and is a principal town around Colombo. It is about 4 km. from Miriswatte on the Colombo Kandy Road Gampaha is connected by road to Miriswatte ,YakkalaJaEla and Minuwangoda . Henarthgoda Botanical Gardens where the first rubber tree planted in Sri Lanka is still present is located close to Gampaha Town. Gampaha can be reached by Railway along Colombo Polgahawela Railway. Gampaha is the home of the famous Ayurveda Physician Wickremarachci who produced hundreds of Ayurveda Physicians who came to be known as Ayurveda Physicians of Gampaha. They are still found all over Sri Lanka. GampahaDistrict is a district in Western Province, Sri Lanka. Its area is 1,386.6 km. Gampaha district was declared as a new administrative district, separated from Colombo District in 1978.[2] Gampaha district is bounded by Kurunegala and Puttalam districts from north, Kegalle District from east, Colombo District from south and by the Indian ocean from west. The exact margins of the district are "Mahaoya" brook from North, "Kelani" river from south and 1000ft contour line from east.

Gampaha district is situated in the west zone with rainfall ranging from 1400 to 2500 mm/annum. Both monsoons provide almost equal amount of precipitation. Temperature is almost constant throughout the year. The average between 27.7C. Average daily sunshine 7-2 hours/day. Average wind velocity is 11-7Km/hr with strongest winds coming in June. Wind direction is dependent on monsoon wind direction. Relative humidity is on the average, 73% during the day and 90% at night.

## Data Analysis

According to the collected data from the sample it can be seen that 50% percent of the people in this area have studied only up to grade five. Out of 50% percents 28% females and 22% male have studied up to grade five. 4.3% have studied up to GCE (O/L) and GCE (A\L) and 21.8% male and 2.3 percent female have studied up to GCE (O\L). Only 4.4% have studied above GCE (O\L) and 2% male and the other 2.4% female. So this table implies that high percentage of males have been educated more than female in this area. The reason for this is that most of the female do not go to school though few have studied up to GCE (O\L). But, males go for labor works after O/Ls with their fathers and neighbors. Due to low level of education the high rate of poverty in this area has badly affected the country. According to their opinion the landfilling is a serious problem in this area and created a number of environmental problems.

Hundred and forty six peoples have taken loans from government banks and it is sixteen percent of the total farmers were observed. Three hundred and fifty five peoples have taken loans from private banks and it is twenty nine percent of the samples. Hundred and thirty five peoples are indebted to individual loan makers who give loans at high rate of interest and it is forty seven percent of the population. Sixty four peoples have taken loans from friends or relatives and it is eight percent of the sample was selected for this study. There is no motivation for the peoples to take loans from government banks and they are indebted to private sector forever. This is a cycle. Because they get loans from private sector in the out of season and pay back in the season, but when the season comes their loan also has been double due to high rate of interest is charged by private sector. Therefore they are unable to release from that circle. They have taken loans and began various small and medium scale businesses but environmental problems reduce the profit of those business activities.

There are various types of rural societies in this area. Those are Gramodaya Society, Farming Society, Cooperative Credit Society and Death Contribution Society. Three hundred and fifteen farmers are members of Gramodaya Society and it is sixty three percent of the observation. Fifty three farmers are members of Farming Society and it is eleven percent of the samples. Eighty nine are members of Cooperative Credit Society and it is eighteen percent of the observation. Forty three are members of Death Contribution Society and it is eight percent of the samples. Many people have multiple memberships in various societies. Majority are members of the Death Contribution Society, because that is the well-functioning society in this area. The reason for that everybody has to face for death and when they have a funeral they have to work together and can be solved economic hardships faced by that time period. These societies have informed to the relevant bodies regarding environmental problems but no proper response from the responsible parties.

Only a very small percentage of the population 8.7% is served by a water supply scheme and the balance obtain their domestic water from shallow wells. The aquifers presumably have an abundance of good quality water. However, there had been instances of contamination of this water due to untreated effluence discharge from factories as well as the crude oil pipe lines springing leaks on its way to the refinery at Sapugaskanda. This however been attended to by carrying out due repairs to the pipe lines. Residents show ever feel uneasy as it could happen again.

About 5.8% of the land area of Gampaha (8110 ha) consist of wet lands. The major wetlands are parts of Negambo lagoon and Muthurajawela marshes. Water bodies comprises 3.3% of

the area of the district. Both fresh water bodies and brakish water. Forest and mangroves comprises 0.4% of the district (610). Especially around Negambo lagoon. These wetlands are important for breeding and feeding grounds of indigenous and migrant bird species and lobster.

The descriptive statistics shows that in education majority of the members of households have passed grade 8. Average age of household head is 48 years. The total of the land holding is two to five acres, and most of the lands are granted by government. They have live stocks also. If not they are unable to survive. Distance to the nearest market is about two kilometers. Distance landfilling area is about half a kilometer. Most of the peoples live very close to the landfilling area. Therefore they are vulnerable to flood and other environmental impact of landfilling.

<b>Residential Solid Waste Generation Amount</b>	
<b>Residential Category</b>	<b>Waste Generation Rate (kg/person/day)</b>
<b>Collection Area</b>	
<b>High Income Level</b>	0.44
<b>Middle Income Level</b>	0.31
<b>Low Income Level</b>	0.27
Average	0.34
<b>Non-Collection Area</b>	0.55
<b>Average Generation of the UC Area</b>	0.39

Source: D.M.C.B. Wijerathna and K. Lee,- 2010

The impact of landfilling on peoples and the dependence on landfilling is  $R^2$  is less than five because cross sectional data are used for this study. The dependent variable is equal to the income gained by jobs and independent variables are the total income and total income square. Knowledge about the socio-economic determinants on jobs dependency and the nature of their impacts is important in making rural resource management policies. Moreover, the effectiveness in the utilization of the resources appears to be linked with a number of socio-economic factors that have affected the decision-making in the landfilling in Sri Lanka. Besides socio-economic factors, rules and regulations imposed by particular institutions may influence the cost of living in this area.

Gross income from the jobs was regressed after socio-economic variables interacted with dummies to find out the distance and family size in order to examine the effect of landfilling on environment. Table 4 defines the explanatory variables incorporated in the econometric analysis. Y (for both dependent variables) was first regressed on all the explanatory variables and their interactions with the dFAMSIZE and dDISTANCE dummies to test whether these variables affected the environment from landfilling. Only family size, landholding, distance dummy and landfilling have statistical and significant effects on environment. According to statistical tests it can be seen that there is some positive impact of landfilling on environment in Sri Lanka.

Landfill gases, and the sheer amount of landfill waste, can easily ignite a fire. Fires can be difficult to put out and contribute to the pollution of the air and water. They can also potentially destroy habitats nearby if not controlled soon enough. The most flammable gas that is most commonly produced by landfills is methane, which is highly combustible. Firefighters will often use a fire-retardant foam to fight fires in landfills due to the presence of chemicals that would not be subdued by water, further adding to the chemical load of these landfills.

Residential Waste Composition (% Wet basis)					
Waste Type	High Income Level	Middle Income Level	Low Income Level	Average	
Kitchen	87.8	84.7	87.2	61.5	80.3
Garden	1.6	4.7	3.1	26.3	8.9
Paper & Cardboard	4.1	4.3	2.6	1.1	3.0
Soft Plastic	3.0	2.8	2.5	2.4	2.7
Hard Plastic	0.2	0.7	1.0	0.4	0.6
Textiles	0.4	1.1	1.0	0.4	0.7
Rubber & Leather	0.1	0.2	0.5	0.2	0.3
Metal	0.6	0.4	0.5	0.8	0.6
Glass	1.4	0.5	0.8	1.2	1.0
Ceramics	0.0	0.0	0.0	0.2	0.05
Hazardous	0.4	0.1	0.1	0.5	0.2
E Wastes	0.0	0.1	0.1	4.9	1.3
Miscellaneous	0.5	0.4	0.6	0.3	0.5

Source: D.M.C.B. Wijerathna and κ. Lee, - 2010

Sometimes, landfills are covered with earth, seeded with grass, and transformed into recreational areas. The management of gasses coming out of these sites is a constant issue, and creates an ongoing cost despite the new facade of the landfill. Products that are natural, such as wasted fruits and vegetables, will decompose within weeks while no more Trash! Reports that items like Styrofoam can take over a million years to decompose.

Though away from the CMC limits, being a suburb to Colombo, the Akbar Town area in Hunupitiya, Wattala bears witness to the adverse effects of unauthorized land filling. For the past several years the area goes under flood waters due to an overflowing canal. The spilling water from the canal affects over 1113 people in the area. The canal that leads through Akbar Town is one of the main waterways that feeds water from Kiribathgoda and Kadawata to the KaluOya. “There is a huge amount of pressure on the canal because it pumps water from largely populated areas. The problem is the authorities haven’t properly cleaned the canals for ages. Resultantly, mud has gathered up reducing the depth of the canal making it overflow at the slightest rain.

Environmentalists warned that filling flood prone areas will have adverse effects not only during the rainy season but also during the dry season. Senior environmentalist, stressed that filling up marshy land, which is a natural water gathering source, can have its adverse effects not only during monsoons but also during droughts as well. Time when the climate is changing and we cannot be sure where things are heading. Therefore, filling up our natural water gathering areas is not the wisest thing we can do. A few months ago there was a fear developing because of the heat and now we experience too much rain. In the future this might lead to elongated cycles of drought and heavy rain. If such a cycle arises we must rely on natural water gathering sources for support. A number of landfills have been in use since long before the popularity of recycling. These landfills contain a wealth of mineral resources that are simply sitting there rotting away, and this has created a unique opportunity for "green" American mining. Miners have bought the rights to a number of different landfill facilities to

conduct mining operations. With all of the precious metals and other minerals that are in electronic waste, more and more companies are looking at landfills as gold mines. This extra activity comes with larger atmospheric pollution via dust; however this is generally offset by the amount of pollution that is not being generated by mining new materials and shipping them around the world.

## Conclusion

Landfills have led to some of the most heated, acrimonious battles over pollution in the public commons that have ever been seen. While there are a number of reasons for the vehement arguments that often surround landfills, one of the largest is the juxtaposition of both the understood need for landfills and the lack of will to live near one. According to the study, the average person dumps almost 4.5 pounds of waste into landfills every single day. With the population skyrocketing across the country, these landfills will only become more of a public issue as time goes on. Despite the arguments over landfills in general, there are no arguments over the assertion that there are many things that contribute to the environmental problem of landfills. Landfill gases, and the sheer amount of landfill waste, can easily ignite a fire. Fires can be difficult to put out and contribute to the pollution of the air and water. They can also potentially destroy habitats nearby if not controlled soon enough. The most flammable gas that is most commonly produced by landfills is methane, which is highly combust able. Firefighters will often use fire-retardant foam to fight fires in landfills due to the presence of chemicals that would not be subdued by water, further adding to the chemical load of these landfills. The environmental problems caused by landfills are numerous. While there are many problems with landfills, the negative effects are most commonly placed into two distinct categories: atmospheric effects and hydrological effects. While these effects are both of equal importance, the specific factors that drive them are important to understand on an individual basis. According to the study, the methane produced by the rotting organic matter in unmanaged landfills is 20 times more effective than carbon dioxide at trapping heat from the sun. Not only does methane get produced by the various forms of rotting organic matter that find their way into landfills, but household cleaning chemicals often make their way here as well. The mixture of chemicals like bleach and ammonia in landfills can produce toxic gases that can significantly impact the quality of air in the vicinity of the landfill. Aside from the various types of gases that can be created by these landfills, dust and other forms of non-chemical contaminants can make their way into the atmosphere. This contributes further to the air quality issue that plagues modern landfills. Landfills also create a toxic soup of industrial and home-cleaning chemicals. People throw away everything from industrial solvents to household cleaners in landfills, and these chemicals accumulate and mix over time. A more immediate concern is for the welfare of the wildlife that comes into contact with these chemicals, and it is not uncommon for animals to suffer inconceivably painful deaths resulting from chemical contamination. While you may not be able to completely eliminate the garbage coming out of your household, there are definitely steps that anyone can take to at least mitigate the amount of trash they produce. There are number of very simple tips that you can integrate into your life if you are interested in lessening your impact. Not all positive environmental steps need to be huge ones. Many small steps can often amount to a large move forward, and there are certainly a few things that everyone can change to become less wasteful. To save our environment and stop the increase of land pollution we must be motivated to consider the inheritors of the Earth, our descendants. What will our children's children have to deal with if we don't make an attempt to control toxins now? A people-idea-exchanging, eco-friendly website, Saving Our Environment, suggests

these tips. Instead of dumping human waste into designated landfills, much of our waste can be recycled or incinerated to lessen pollutants. State and federal governments need to design, enforce, and control the best ways to deal with domestic waste. Plant-based insecticides should be used by farmers and with more affordable pricing. If a farmer has a choice of a cheaper insecticide that is not good for the land compared to a more expensive eco-friendly product, which one do you think they will choose? Governments and manufacturers of harmful insecticides need to be more proactive in developing affordable pesticides. This type of waste comes from mining and mining pools where predetermined holes are used to dump mining waste. Mining and other industrial wastes will contaminate the soil over a period and, again, rules and regulations on how to deal with mining and industrial waste should be addressed and enforced. Soil and groundwater pollution in both closed and in-use landfill sites present many concerns for municipal environmental departments. The environmental impact of a landfill site must be determined to ensure that the quality of life in the surrounding area is maintained. Hetek's qualified staff provides cost effective solutions from the initial evaluation to the final control of pollutants in landfill sites. To deal with the human element of waste, communities must join to reduce waste, recycle waste or reuse waste. Recycling the waste from our homes is as easy as designating containers for plastics, glass, metals, and paper. Once these types of wastes are mixed, it's hard to recycle them. For example, you can turn food waste into compost for gardening and farming. Glass, plastics, and metals can be returned and recycled at the manufacturer level; however if they can't receive the recycled materials in a single form, the effort fails.

The government should be steadily increasing landfill tax and waste producers are willing to pay for alternative disposal routes. Introducing the renewable heat incentive, which will encourage more plants to sell the heat they generate when biogas is burned to produce electricity. It's a good thing to support this budding industry and to impose taxes that reflect the real environmental cost of landfill. Sending food waste into plant only recovers a fraction of the energy that went into growing the food in the first place. Recycling tomatoes in this way, for example, generates less than 1% of the energy used to produce the crop.

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