

Decades to Accumulate, Seconds to fall: A Case Study on Meethotamulla Garbage Dump Collapse in Sri Lanka

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ABSTRACT

This investigation presents a case study on one of Sri Lanka's most devastating man-made environmental catastrophes. Three decades ago, a marshland (paddy field) was converted into a dumping site for municipal garbage. With the increasing population and urbanization, the country lacked a more suitable method for waste disposal. The continued practice resulted in a large mountain of solid waste. Experts suggest that physical characteristics, instability of the bottom layers and increase in the water table caused the collapse. Mountainous shaped dump has been growing in size and reached ~50 m in height and was occupying ~40 acers. The extent of the area has not undergone any significant change. Spreading chemicals, intense rain and heavy garbage loading has contributed to the collapse. Residents did not come across any signs of danger prior to the incident.

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KEYWORDS: solid waste management, Sri Lanka, disaster, open garbage dumping, Meethotamulla

INTRODUCTION

The Waste management is becoming an increasing problem in most parts of the world. With the growing populations, and expanding economies coupled with urbanization have led to accelerated generation of municipal solid wastes in developing countries (Minghua et al., 2009). In some countries, the issues of solid wastes are growing at a faster than their urban populations (Hoorweg and Bhada-Tata, 2012). Consumption rates of goods and the waste generation in the developing countries have demonstrated a rapid increase, and are believed to be doubled in near future (Kumar and Nandini, 2000 ; Okalebo et al., 2014). This will lead to significant waste management issues with regards to collection, transportation and disposal of waste (Ejaz et al., 2010). Due to shortage of suitable land sites, open dumping has become the typical practice waste disposal method. It causes inconvenience, environmental pollution, and serious public health risks (Yoada et al., 2014). Illegal open dumping has also led to pollution of both surface and ground water resources via faecal matter (Mor et al., 2006), and heavy metal (Kanmani and Gandhimathi, 2013) contamination. Due to lack of effective legislation for solid waste management, the governments tend to dump such solid wastes in river banks and low lying marshland (Henry, Yongsheng and Jun, 2006). As a result, deterioration of many

environmental aspects including soil quality, altered pH of soil and impacts on vegetation have been reported (Ali et al., 2014).

The situation in Sri Lanka is no difference. Changes in lifestyle patterns and income-levels resulted in rapid increase of solid waste generation. The per capita generation of wastes in the country is approximately 0.62 kg of solid waste per day (Visvanathan and Trankler, 2003). Typically, the local authorities in Sri Lanka manage municipal waste by dumping in open sites without proper treatment measures. In general, these wastes are characterized by high moisture and organic matter contents (Bandara, 2008). Colombo, the administrative capital and the most populated city in the country hosts one of the largest open dumps in the island. This dump popularly known as Meethotamulla, is located 4.0 km east of Colombo in Pothwillkumbura (coordinates??). The site consists of solid waste collected by the Colombo municipal council for more than 3 decades.

On 14th April 2017, Meethotamulla dump collapsed recording the serious tragic man made environmental disasters in the recent Sri Lankan history. The tragedy ended up burring 32 people, destroying 60 houses completely and 27 houses

partially. According to an expert report, infiltration of rain water through the garbage dump resulted in instability of the bottom layers, increase in the water table and decrease in the strength of the upper layers due to accumulation of water are among contributory factors (NBRO, 2017). This incident was an eye opener following which many steps were taken by the government and the local authorities to streamline the garbage disposal and management. Similar to any other disasters, the collapse had a major impact on the socio-economic context of the country (Shaw et al., 2003; Shaw and Goda, 2004).

In this context, the present study was carried out with two focuses: firstly to report and analyse the observations of the communities living in the Meethotamulla open dump site. Secondly, this investigation extends to present an overview of the growth of the dumping site over 15 years using GIS and remote sensing technologies.

METHODOLOGY

In a pilot survey, two administrative divisions that were found to have been affected by the collapse of the dump, Dhampura and Meethotamulla Grama Niladharee Divisions (GND) located in Kolonnawa Divisional Secretariat Division were selected as the areas of study. Residential area was separated from the dump by a road or a strip of land. Before the disaster happened, many families have been residing near the outer boundaries of the dump in permanent and temporary housing.

Data collection was carried out through a questionnaire survey, focus group discussions and interviews with residents of the area who have been residing near the dumped site at the time of the collapse. One member from each of the eight most affected families were interviewed for thirty minutes per member by one of the two interviewees. The information gathered focused on the history of open dumping at Meethotamulla, environmental and sociological problems faced by the residents, and any early signs of the collapse. Before the focus group interviews began, all group members were given a brief introduction about the objectives of the study. A group of randomly selected residents were interviewed. All responses were recorded for further analysis. Questionnaires were distributed randomly among the affected residents.

Subsequently satellite images extracted from google earth were screened and digitized using Arc map 10.1. The extracted images were depictions of the extent and the outer appearance of the garbage dump in the years of 2004, 2009, 2012, 2014 to 2018. For each year maps were produced to observe the variation in extent of the garbage dump and extents were calculated.

RESULTS

Results of the questionnaire survey and discussions are summarized below. The age of the respondents ranged from 33 to 87 years and 3 out of 16 respondents were males. All respondents were permanent residents in the area.

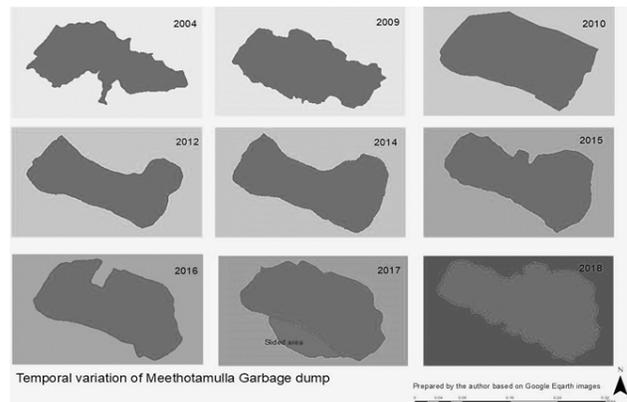


Figure1. Temporal variation of Meethotamulla garbage dump

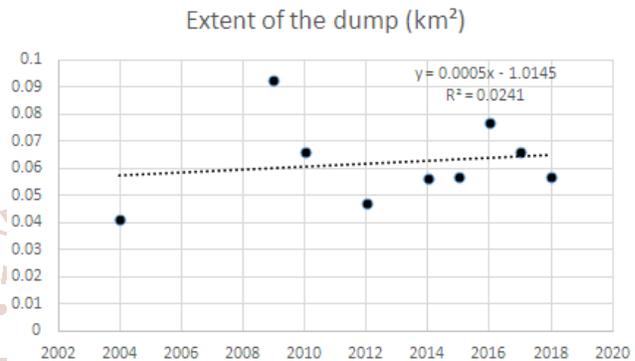


Figure2. Scatter plot with regression line depicting year Vs extent of the dump

According to the survey results, the area was a paddy field before it was converted to a garbage dump. The questionnaire revealed that a majority 70% of the residents have been occupants for 20 - 24 years and therefore are well aware about the dump and its history. Nearly 50% of the respondents stated that garbage dumping began in 1988 and the rest stated it was around 1987-86. During the history of the dump of nearly three decades, there was a halt in dumping process during 2010 and 2011. The shape of the garbage dump was stated by the villagers as mountainous with a height of 45 to 55 ft. while the extent was 40 to 42 acres. The majority of the witnesses of the incident stated that the collapse was rapid and took less than a minute. Everybody expressed that they heard a huge sound like an explosion. However, prior to the incident, any sign of collapse or any other alerts such as cracks were nor evident or observed by the residents. Bursting of water pipes have been witnessed by a few. There were different opinions about the possible cause of the collapse. Nearly 50 % of the respondents related to the incident to a spread of chemicals in to the dump by the authorities. However, we did not find any official event to prove this statement. Moreover, some 15% of the respondents believe that the incident was a result of heavy rains as well as the spread of chemicals. The rest was under the opinion the dump collapsed due to the overwhelming weight of the garbage.

VARIATION IN THE EXTENT OF THE GARBAGE DUMP

The extent has been fluctuating throughout the past two decades and the highest has been recorded in 2009. Following figures shows the variation of extent recorded by the satellite imagery by Google Earth®.

Before the collapse in 2017, the area has been 0.06599 km² which is not the largest recorded in the history of the garbage dump. The following graph (figure 2) is a scatter plot of the extent of the garbage dump against time. The trend line for the data did not show any significant trend in the extent of the garbage dump (R^2 value is closer to 0). With the available data, it can be suggested that variation of the extent of the garbage dump has not played a major role in the incident.

DISCUSSION

The collapse of Meethotamulla garbage dump was one of the most devastating man-made environmental events in the history of the country. The event is a significant eye opener for environmental hazards in Sri Lanka that has brought about changes in attitudes and practices both in the communities as well as in the government.

One important aspect of solid waste issue in the country is attitudes of the communities when the government took a decision to look for alternative sites and move solid waste dumping sites away from the cities to suburbs or remote areas. The mind-set of the people, in general, seems not to accept garbage from elsewhere to their residential areas. Some unsatisfied parties went to the extent of seeking legal remedies to stop dumping solid waste generated by the dwellers in other parts of the country to their villages or residential areas. After Meethotamulla incident, communities were significantly expressing their displeasure and fear about dumping sites. Considering numerous court cases filed by the resident of an alternative site at Karadiyana, the district court limited the amount and granted permission to the municipal authorities to dump only a maximum of 350 tons of solid wastes. Yet, a group at the Karadiyana turned back several garbage trucks and protested against the decision. Similarly, people of Veyangoda and Dompe which are remote areas followed law suit against the disposal of garbage collected from Colombo. Protests were also staged in Uswetikeiyawa, Wattala against the disposal of garbage in marshy lands in Muthurajawela (Fernando, 2017).

Following the collapse, a new era of solid waste disposal awareness, policy and regulations were initiated. Many forums were organized by the government, community organizations and private sector parties to discuss options for proper solid waste management and strong media campaigns were started to raise public awareness on effective waste management including reducing, reusing and recycling wastes.

After the collapse of the garbage mound, the government took several proactive initiatives to manage solid waste disposal in a more efficient and secure manner. One such step to remove the garbage collected from the Colombo Municipal Council (CMC) area to Karadiyana and Dompe solid-waste processing centres, which were operating in a small scale previously. Initiation of new waste management facilities too were apparent. A new facility at the Thambovila, Karadiyana which is capable of processing up to 500 tons solid waste per day was initiated. Another key policy was the formulation of regulations to segregate garbage by household or commercial level, which is now being practiced effectively in many parts of the country.

Nevertheless, garbage dumps are creating continuous problems due to many years of ad hoc practices, inadequate public participation as well as institutional policy failures: the most recent local example is fire at Mawanella garbage dump in Kandy, which took place on 16th February 2018 destroying four acres of rubber plantation.

As sound management policies, technologies, and attitudes could offer a wide array of environmental and social benefits (Shang et al., 2010), including climate change mitigation (Vergara and Tchobanoglous, 2012), both government and communities should now work together to provide sustainable solution for solid waste management challenges.

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