



The adverse environmental impact of waste accumulation at Meethotamulla waste dump

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Abstract: As the population expands, solid waste disposal has become a major concern in Sri Lanka. Waste disposal in an open area (open dumping) without any safety measures has had an undesirable environmental impact. For a variety of reasons, open dumping is seen as very troublesome and environmentally hazardous. The Meethotamulla garbage dump, which has been in operation since 2000, was an open dumping spot that accumulated waste from the Colombo Municipal Council and a few regions nearby. The adverse environmental impact of this accumulation at the Meethotamulla garbage dump is important, as it produces an imbalance in the environment, pollutes air, contaminates groundwater and soil, and risks human and animal well-being. This review focuses primarily on the adverse environmental impact caused by waste accumulation at Meethotamulla garbage dump.

Index Terms: Environmental impact, Meethotamulla, Solid waste management, Waste accumulation

1 INTRODUCTION

Solid waste management has become a growing issue in most regions worldwide. Growing population, rising economy, and urbanization have resulted in an increase in the urban generation of solid waste in third-world countries. Due to the lack of suitable land spots, open dumping has now become the most common garbage disposal alternative. It pollutes the environment and poses substantial public health hazards. Further, Illegal open dumping has also contaminated the surface and groundwater resources with waste products and toxic metal substances.

Changes in lifestyle and financial status have resulted in a rapid increase in solid waste output in Sri Lanka as well. The administrative capital and the most crowded city in the country, Colombo, is the location of one of the country's largest open dumping sites. Meethotamulla, which is located in Pothuwilkumbura, is widely renowned for this. This spot has formed up of solid wastes that reached from the Colombo Municipal Council and a few regions nearby over two decades[1]. All wastes, including slaughterhouse leftovers, were thrown in this spot, leading to extremely harmful and unsanitary circumstances not just within the site but also in the surrounding area. [2].

On April 14, 2017, this open dumping site tragically collapsed, devastating the infrastructure and structures, which were located at the bottom region of the garbage mound's southwestern edge. The Disaster Management Center's situation report for the "Meethotamulla Municipal Solid Waste Dump Disaster" stated that 60 houses have been fully demolished, while 27 houses have not been fully damaged, and 32 deaths have been found in the devastated region[3].

This review will examine the adverse environmental impact of the open dumping site in Meethotamulla, focusing on the consequences of such practices as air pollution and emissions, soil and groundwater contamination, water pollution, ecological disruption, and odor and visual impacts.

2 ADVERSE IMPACT ON THE ENVIRONMENT

2.1 Air Pollution and Emissions

Air Pollution is a major concern for both the environment and human health. Typically, in any open dumping spot, the decomposition and combustion of waste materials release harmful gases, various matter, and volatile organic compounds into the air. These emissions may consist of gases such as methane, carbon dioxide, sulfur dioxide, nitrogen oxides, and various toxic pollutants. The release of such pollutants leads to deteriorating air quality, creating a range of adverse environmental impacts. So, with time, this will cause respiratory problems, cardiovascular issues, and other adverse health effects to nearby residents[4].

The accumulation of waste over many decades at Meethotamulla was also producing methane gas, which caused fires in numerous areas of the site[2]. Despite the fact that the Meethotamulla garbage dump was abandoned, Methane gas emission has not halted. Furthermore, an explosion resulting from released gas at the Meethotamulla dump site damaged more than 100 houses, and pollutants adversely affected so many families living in that area. The soil used to cover the garbage dump in order to prevent odor has generated permanent dust, and residents complained about waste pickers for the reason of burning non-recyclable wastes, which contributed to further air pollution.[5].

2.2 Soil and Groundwater Contamination

Soil and groundwater contamination is also a major concern with severe consequences. Dumping waste without proper containment measures allows harmful substances to seep into the soil and potentially contaminate groundwater sources.

The Meethotamulla, an open dumping site, is comprised of several soil types, bog and half-bog soils, as well as red and yellow podzolic soils with soft or hard laterite[3]. Deposition of waste on such soils, even in an open dumping spot like this, may cause waterlogging and influence the soil structure. Waste accumulation can impede natural drainage, increasing stagnation and probable leachate runoff. This can contaminate surrounding water supplies, impacting both surface water and groundwater quality. In addition, water infiltration and drainage may be limited, potentially leading to surface water runoff and erosion. It may also restrict oxygen and nutrient transmission within the soil, impacting soil health[6].

2.3 Surface Water Pollution

Surface water contamination can harm biodiversity as well as human activities that rely on clean water supplies. When rain or runoff washes away garbage that has accumulated in dumping sites without

adequate containment techniques, it carries various contaminants and pollutants into nearby surface water bodies.

As the Meethotamulla dumping spot was a paddy field region before, it experienced frequent storm water floods of various magnitudes. An intense precipitation event in 2016 covered most of the waste fill's surrounding area entirely with strong floods. As a result of this event, the water flow rate has been lowered due to bottleneck spots, particularly in culvert areas, resulting in a water-logged situation throughout the year[3].

In addition, those floods may significantly contribute to surface water pollution in several other ways as well. Storm water floods may collect and carry out different pollutants such as solid wastes, chemicals, and contaminants in waste materials from the dumping site. Flood water can potentially pick up pollutants and transport them to nearby surface water bodies when it flows over the dumping site. This increases pollutant infiltration, leading to an immediate and considerable increase in water pollution levels.

2.4 Odor and Visual Impact

A dumping site's odor and visual impact might be extremely unpleasant. Organic waste decomposition produces foul-smelling from different gaseous chemicals, which can produce unpleasant and pervasive odors that permeate the surrounding air. The unpleasant appearance of waste accumulated, litter, and uncontrolled dumping creates an unappealing environment.

The presence of decomposing organic material, which releases volatile chemicals into the air, could account for the unpleasant odor originating from the dumping. These substances contribute to air pollution and may adversely affect local air quality. The discharge of different gaseous chemicals can cause smog and contribute to the degradation of atmospheric conditions.

Waste accumulation changes the ecosystem's physical properties, resulting in soil compaction and habitat damage. Soil and vegetation disturbance can also result in biodiversity loss and the displacement of native flora and fauna. This disruption has the potential to have an impact on ecological systems like nutrient cycling, pollination, and wildlife migration patterns.

3 CONCLUSION

The adverse environmental impact of open dumping waste accumulation offers massive challenges that require immediate attention. In order to reduce these effects and establish sustainable, livable urban settings for current and future generations, it is necessary to recognize the effect on air, water, and soil quality, biodiversity, and climate change. Transitioning to responsible waste management practices is critical for environmental protection and promoting sustainable urban growth. By exploring these diverse aspects, it can highlight the considerable environmental issues connected with open dumping waste sites such as Meethotamulla and highlight the need for sustainable waste management methods to mitigate these negative consequences.

After the catastrophic collapse, the government abandoned the Meethotamulla site and implemented many mitigating measures to reduce the impact caused by the waste dump. However, residents in that area indicated that those operations had been halted due to the pandemic and had not yet begun effectively. It would be difficult to reduce the adverse environmental effects caused by the presence of the dumping site

because that site has been used as a dumping site for decades.

Proper site remediation is required to mitigate this garbage dump's adverse environmental impact. This comprises cleaning up accumulated waste, hazardous substances, and contaminants in a methodical and controlled manner. Following that, it will be able to prevent additional waste accumulation and potential pollution.

As this Meethotamulla garbage site often leaves behind soil and groundwater contamination, the remediation tasks and operations should focus on cleaning up and restoring these resources. Soil contamination can be addressed using techniques such as soil excavation and stabilization. Pump-and-treat systems and groundwater monitoring can be used to remove pollutants and restore the water quality in groundwater.

Additionally, effective surface water management measures should also be used to limit the effect on surface water bodies near the dumping site. As it has begun converting the dumping site into a wetland, it will begin to collect and treat runoff from the site, preventing contaminants from accessing nearby water bodies. Erosion management methods and the establishment of vegetative buffers can also help reduce storm water runoff's impact on surface water quality.

Finally, in order to ensure long-term mitigation, the site must be monitored and maintained regularly. This includes conducting periodic inspections, monitoring the changes in the environment, and assessing the site to identify any potential threats or symptoms of pollution. Implementing adequate maintenance measures, such as covering exposed areas with soil or vegetation, helps minimize odors and prevents erosion. This should also be done with adequate awareness, minimizing the negative influence of this process on nearby residents.

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