

Reviving Soil through Proper Waste Management for Ensuring Sustainable Development: A Case Study of Amin Bazar Dumping Station



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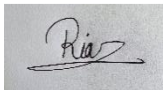
Subject: Prayer for submission of Dissertation

Dear Sir,

It is an excellent pressure on behalf of me that I even have been ready to make research on “**Reviving Soil through Proper Waste Management for Ensuring Sustainable Development: A Case Study of Amin Bazar Dumping Station**”. In concluding this research, I even have given all of my best afford to make useful research and by collecting all the relevant information from different sources which will fulfill your expectation.

Therefore, I shall remain grateful to you if you undergo this thesis paper for your evaluation and I would be like that if any valuable recommendation is made on your part in this matter.

I am always available for any longer clarification of any part of this paper at your convenience.



Sincerely yours,

Md. Jubayer Ahmed Riaz

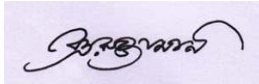
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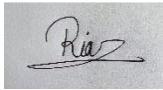
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Declaration

I hereby solemnly declare that thesis title “**Reviving Soil through Proper Waste Management for Ensuring Sustainable Development: A Case Study of Amin Bazar Dumping Station**” submitted by me in partial fulfillment of the requirement for award of degree of master of laws, Department of Law, Daffodil International University.

I further declare that the research work presented in this thesis is original and it has not been submitted earlier partly or wholly to any other university for any academic qualification/certificate/diploma degree. The work I have presented does not breach any copyright.



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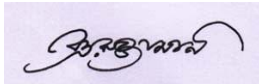
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Certification

This is to certify that thesis on “**Reviving Soil through Proper Waste Management for Ensuring Sustainable Development: A Case Study of Amin Bazar Dumping Station**” has been prepared by Md. Jubayer Ahmed Riaz. It is prepared for the partial fulfillment of the requirement for the award of the degree of Master of Laws, Department of Law, Daffodil International University. The research has been carried out with my guidance and as research of the bonafide work carried out successfully.



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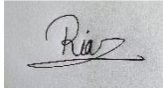
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Finally, I express thanks to my classmates and well-wishers.



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Dedication

Firstly, I am showing very much respect and gratitude to Allah. I would like to express my gratitude and love to my parents for their encouragement and to provide me with opportunities for higher education. They are still guiding me to a good human being and motivated me to dedicate myself to the benefit of the country.

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Abstract

To understand how management strategies affect soil pollution and environmental quality in the surrounding areas, two landfills in Dhaka are investigated. Investigate waste movement, leachate percolation, and unfavorable health and environmental repercussions, a combination of research methods is employed, including geospatial buffer zone analyses, semi-structured observation checklists, and qualitative interviews. ArcMap was used to apply a multi-ring buffer zone and ground truth approach to the spatial distribution of environmental elements near landfills. Officials from the landfill and locals were interviewed in-depth. According to research, residential areas, water bodies, and agricultural fields are all in close proximity to landfills, which exposes them to a variety of health and environmental risks. Leachate percolation, trash incineration, and vector breeding are all negative environmental repercussions of improper solid waste management procedures used in landfills. Residents nearby have respiratory illnesses, pneumonia, diarrhea, itching issues, headaches, and loss of appetite. To lessen the associated soil pollution and health risks, the current solid waste management system needs administrative and technical improvements.

Keywords: Soil Pollution, Landfill, Bangladesh, Waste Management, Sustainable Development, Agricultural practice.

CHAPTER ONE

Preliminary

1.1 Introduction: Amin bazar landfill was converted into a rubbish disposal facility in 2007 and is located alongside the Dhaka-Aricha highway, some 30 kilometers from the capital Dhaka. After ten years, the Amin bazar landfill has developed into the threat to the lives and livelihoods of the residents of Konda and Ballarpur in Savar. The waste heap at Amin Bazar landfill is nine meters long, or the length of a two-story building. Savar's Amin Bazar landfill is managed by Dhaka North City Corporation (DNCC). The landfill's environmental clearance ran out in 2017.



Amin Bazar Dump Station

The parliamentary committee of Forest, Environment and Climate Change, Bangladesh, has recommended imposing a maximum fine against Dhaka North City Corporation for environmental pollution through garbage dumping stations. They complained that the DNCC is dumping waste here without environmental clearance.

Since 2007, the Dhaka City Corporation has used this wetland at Amin bazar in Savar as a City waste dumping station. At present, about 3200 tons of waste is dumped here, collected from the 54 wards of North City every day.

Although garbage is supposed dumping across 50 acres of land, in reality, it is spreading in more places. Simultaneously, Dirt from the landfill is overflowing in surrounding water bodies, including Turag River, during the rainy season. A total of 50,000–60,000 residents from the villages of Konda and Ballarpur are among the victims of the dump. Vicinity of the Amin bazar landfill in Ballarpur. The overwhelming smell of trash makes life for those who reside here intolerable. They are also financially disadvantaged.

Environmental and public health are directly impacted by waste management strategies. Improved administrative capabilities are needed at landfills to guarantee proper waste management practices. Together with enforcement actions for unlawful waste operations, increased knowledge of the negative effects of uncontrolled trash dumping is also required among the general public and garbage handlers. It is also necessary to apply a low-tech, straightforward, and creative technique to enhance the leachate treatment procedure.

In order to reduce landfill odor, environmentally friendly remedies should be taken into account. To ensure the effective use of comfortable and convenient safety gear and to stop vector reproduction, regular training programs and monitoring activities are required.

To overcome these issues, Dhaka's waste management procedures could be improved. To ensure a decrease in the amount of garbage dumped at landfills, source waste reduction must be done.

1.2 Statement of the Problem: Soil pollution has a negative influence on food security in two ways: first, it can reduce crop yields due to hazardous contamination levels, and second, it makes crops unsafe for human and animal use.

1.3 Scope of the Study: This section displays the research's findings in a topical manner. The management and waste treatment process, including the leachate

Percolation chain, environmental and soil contamination of the landfill's surrounding areas, and the health concerns to landfill workers and nearby residents are among the topics that have been found.

1.4 Objective of the Study: This paper has a few goals, with the main one being to ensure sustainable growth by revitalizing the soil through good waste management.

- i. To shield our farmland from trash and to repair and lessen the harm that pollution causes.
- ii. To steadily raise agricultural yield without harming the soil's health.

1.5 Review of Related Literature: Literature review makes the researcher aware of other related work that has already been done. Literature review broadens and sharpens the researcher's knowledge in conducting research. A literature review also reveals the researcher's theoretical knowledge in his chosen field of study. It helps to find knowledge gap between previous researcher and current researcher. Some relevant literature has already been reviewed to guide the present research proposal

Md. Saiful Islam and Aysha Sultana (2015), in their research “The Present State and Economical Prospects of Solid Waste at Amin Bazar Waste Dumping Site” The study was conducted to explore the current status and economic potential of solid waste management at Amin Bazar waste dumping site, Dhaka. A total of 48 waste samples were collected during both dry and wet seasons to study the physical composition, pH and moisture content of the abandoned waste. The waste consisted of plastics (6%), paper (3.5%), glass (0.23%), garden waste (8.5%), food products (72.25%), metals (0.16%) and textile products (3.25%). The pH value of the sample was between 6.9-7.8 indicating neutral condition. The bulk of the waste was organic (72%). About 14.38% of waste is recyclable but there are no recycling and composting facilities. Proper recycling of amine market solid waste can be a source of compost and useful metal resources that can contribute to safe and sustainable environmental management.

Rafiul Alam and Mohammed Uzzal Chowdhury (2020) discuss in their Paper “Dhaka Landfill Waste Practices” Waste management practices have a direct impact on the environment and public health. Existing waste management systems in Dhaka can be better organized to address these concerns. Source waste reduction must be implemented to ensure the reduction of waste disposed of in landfills. Administrative capacity of landfills needs to be improved to ensure proper waste management practices. Increased awareness among the general population and waste handlers about the adverse effects of uncontrolled waste dumping is also needed, along with enforcement measures for inappropriate waste practices. The application of a low-tech, simple and innovative method is also required to improve the leachate treatment process. Environmentally friendly treatment should be considered to reduce landfill odors. Regular training programs and monitoring programs are needed to ensure proper use of comfortable and convenient safety gear and reduce vector reproduction.

Zahidul Quayyum and Salma Akter Urme (2019), in their research “The Study on the solid waste management in Dhaka City” The landfills explored how management practices affect environmental quality and public health in the surrounding area. A combination of research methods are used, such as geospatial buffer zone analysis, semi-structured observation checklists and qualitative interviews, to understand waste transport, leachate percolation and adverse health and environmental impacts. A multi-ring buffer zone and ground truth method was applied through ArcMap to map the spatial distribution of landfill-adjacent environmental features. Qualitative interviews were conducted with landfill officials and neighborhood residents. Findings reveal that landfills are located very close to residential areas, water bodies and agricultural land, exposing them to various health and environmental hazards. Improper solid waste management practices in landfills cause adverse environmental impacts through leachate percolation, waste incineration and vector breeding. Nearby residents suffer from respiratory diseases, pneumonia, diarrhea, itching problems, headaches and loss of appetite. Existing solid waste management systems require managerial and technological changes to reduce associated environmental pollution and health risks.

1.6 Limitation of the Study: Even though I worked very hard to do the study in a way that results in the example, I must admit that I ran into some difficulties.

These difficulties are as follows:

Not having enough time: Time is one of the most crucial variables when conducting research. What the research methodology will be is dependent on time.

There are numerous tests, quizzes, assignments, and other tasks throughout our six-month semester. I was unable to conduct this investigation as thoroughly as I would have liked.

Lack of Primary Data: Despite my best efforts, I was unable to collect any primary data during my two visits to the Amin Bazar dump station. I spoke with the workers and farmers nearby about the issue in an effort to get more information, but I was unable to obtain accurate information. For this reason, I used both secondary and primary data in my research. I can create a successful research article if I obtain appropriate primary data.

1.7 Geographical Location of the Study Area: The DNCC's Amin Bazaar Landfill opened in 2007 on 52 acres (21 hectares) of land in Saver Upazila, 24 kilometers north-west of Dhaka City. Nearly five zones and 36 wards of the DNCC are covered by this waste. The Mutual Union's other landfill, which is run by the DSCC and is located about 8 kilometers from Glisten to the south of Dhaka, was built as an open dumping site in 1995 and expanded by 50 additional acres (20 ha) in 2006. It includes 57 wards in five DSCC zones. The Mutual and Amin bazar landfills handle Dhaka's tertiary garbage treatment. The Mutual dump is located in the southern region of Dhaka, around 300 meters from Mutual main highway and 3.75 kilometers from Glisten, the city's geographic center. Over 100 acres (40.5 hectares) are taken up by this dump, and the government is attempting to purchase an additional 81 acres. The Amin bazar landfill is located in the northwest of Dhaka, around 1 km from the city's primary roadway at the opposite end of the city.

Nearby residential areas, bodies of water, and agricultural land are all within 500 meters of both landfills, putting them at danger from a variety of sources. In comparison to the Amin bazar landfill, the Mutual is located closer to the settlement density and built-up regions. The Amin bazar dump is located near numerous

Waterbodies, agricultural areas, and a river, but it is also on top of a lower flood flow zone. The assigned distance from the two landfills was displayed using a multi-ring buffer zone analysis with 500, 700, and 1000 m benchmarks (the greater distance represents less exposure to pollution). The spatial distribution of environmental features is shown in this analysis. Waterbodies, agricultural land, the river, other populated areas, and the possibility of exposure from landfills. This analysis is shown in Figure 2 for Amin Bazaar and Mutual, respectively.

It was a farmland. A low-lying location, it appeared more like a shallow body of water during the rainy season, while during the rest of the year, paddy and vegetable plants danced in the winds. About 30 kilometers outside of the capital, on that piece of land by the Dhaka-Arica highway, trash was first dumped there in 2007. After more than ten years, the Amin bazar dump has developed into the menace to lives and livelihoods that the residents of Konda and Balaarpur in Savar most feared. The 52-acre Amin bazar landfill houses waste from the capital city, but unchecked disposal has wreaked havoc on the two communities' air, water, and lands. As a result, at least 22,000 people' economic activities, such as farming and fishing, have been impacted, as predicted by the Bangladesh Environment Lawyers Association (BELA) before the landfill began operating. Rains carry plastic debris and other types of trash onto nearby places. Leachate that drains off excrement during dry seasons contaminates the soil, causing farmers to abandon arable land. The garbage that hawks, crows, and rodents eat and leave on their trails pollutes the areas of land a little distance away from the construction site as well. Similar cases can be seen in the adjacent streams and waterbodies. Everyone can smell the stench from kilometers away thanks to the abundance of gases released by decomposing rubbish.

1.8 Research Methodology: This study employs qualitative research, including essential data from qualitative observation. Both primary data and secondary data were used in this study. Techniques for Research Qualitative approaches are employed in this investigation. These data were gathered through field investigation and also by obtaining some information from farmers outside of the study area. This location is not only causing soil degradation, but the entire environmental system is also being harmed by the waste disposal facility. On the other hand, agricultural area adjacent to the waste became infertile for this reason. I spoke with a few employees

At the research location, and they reported a lack of waste management equipment.

CHAPTER TWO

Conceptual Framework

2.1 Soil Pollution: The contamination of soil with abnormally high amounts of harmful compounds is referred to as soil pollution. With the numerous health risks it contains, it is a severe environmental concern. For instance, exposure to soil with high benzene concentrations increases the risk of developing leukemia.

2.2 Sustainable Development and Soil Preservation: Humans produce a lot of trash, much of which now has an impact on the environment, including the land we live on, the water we drink, and the air we breathe. The majority of the approximately 11.2 billion tons of solid garbage collected worldwide, according to the UN, comes from humans.

Hence, in addition to managing this trash, we also need to develop plans that will do it in a sustainable manner. This article will discuss sustainable waste management, its significance, and suggested sustainable waste management solutions.

The act of gathering, moving, processing, or discarding various waste products while controlling and keeping an eye on them is referred to as waste management. Sustainability must be observed in this area so that all trash can be managed effectively rather than simply being dumped in landfills.

Natural resource utilization and human history have always been intertwined; they will remain so now and into the future. The success or fall of civilizations depends on how well people understand how to manage natural resources, such as soil, in a sustainable manner and, eventually, how to prevent their loss or degradation through careless human activity. One of the most significant risks affecting the three natural resources directly or indirectly is soil pollution. Yet, from the beginning of agriculture, soil has been used, which necessarily results in an alteration of its fundamental characteristics and functioning and might cause its intrinsic

Degradation. Soil conservation entails both defending against dangers and using multipurpose soils sustainably. Due to the huge number of components in soils as well as the interactions and feedbacks between these components, managing soils sustainably needs a complex, interdisciplinary approach.

2.3 Sustainable Waste Management: This phrase relates to the collecting of waste. Transportation, recycling, and disposal of different waste kinds without endangering the environment, human health, or future generations. It encompasses all operations connected to the management of trash, from creation through disposal.

Sustainable waste management aims to reuse as many naturally occurring materials as is practical in order to minimize the use of natural resources. To protect sustainability for the sake of both our environment and future generations, it is our responsibility. In order for a sustainable waste management system to be effective, it must contain feedback loops, put an emphasis on processes, exhibit adaptability, and divert trash from disposal.

The circular economy's central idea of sustainable waste management has numerous opportunities and advantages for the economy, society, and environment. Collection, sorting, treatment, and recycling of garbage are all components of sustainable waste management, as is the provision of an energy and resource source when done appropriately. As a result, it boosts waste management techniques, provides jobs, and reduces the negative effects of human activity on the environment, consequently enhancing the quality of the air and water. Also, it lessens food waste, prevents some human health disorders, and minimizes negative environmental effects, all of which enhance human existence in general.

Instead of using waste management as a last resort to properly manage waste, use a sustainable materials management strategy. The former requires you to take a close look at all the waste produced and come up with various ways to recycle or reuse the waste. The latter, however, enables you to deliberately and intelligently choose how materials should flow at various manufacturing phases to produce minimal waste.

2.4 Soil stability Human Health: Healthy soils produce nutrient-rich food, pure drinking water, and raw materials, and perform carbon sequestration tasks, which are crucial ecosystem services for ensuring food security, combating climate change, and preserving human health. Food security is impacted by soil pollution in two ways. First, because hazardous pollutants damage soil over time,

Soil contamination can lower crop production. Second, contaminated soil can render food unfit for human consumption.

It is estimated that each year, human exposure to soil contamination causes more than 5,000,000 premature deaths worldwide. (2018 Landrigan et al). The majority of these fatalities occur in vulnerably exposed populations, namely youngsters and the elderly. Furthermore, since only a small subset of pollutants were involved in these deaths, the overall impact of soil contaminants on people's health and welfare is probably greater.

Pollutants in soil can influence a variety of organs, including the immune, reproductive, neurological, and cardiovascular systems, among others, depending on the substances they contain. There is evidence that poorer households are disproportionately affected by the health effects of soil contamination.

2.5 What Harmful Effects Does Soil Pollution Have?

A wide range of unfavorable effects caused by soil contamination harm people, animals, plants, and the environment as a whole. Children are more vulnerable to disease, so contaminated soil is more dangerous to them. This subsection goes into detail about several significant implications of soil pollution.

2.6 Effect on Human Being: Contaminants in soil can occur in any of the three phases (soil, liquid and gaseous). As a result, there are numerous ways that these toxins might enter the human body, either through direct skin contact or by being inhaled along with contaminated soil dust.

- In the short term, exposure to polluted soil can cause headaches, nausea, and vomiting in people.
- Wheezing, chest discomfort, and coughing
- Skin irritation and eye irritation.
- Weakness and exhaustion.

Soil contamination has been connected to numerous chronic illnesses. Here is a list of a few of these ailments. The neurological system may suffer lasting harm if exposed to high levels of lead. Children are especially susceptible to lead exposure.

Decrease in CNS function (Central Nervous System).

Damage to important organs like the liver and kidney.

Greater chance of getting cancer.

2.7 Effect on Plants and Animals: When nutrient availability decreases as a result of soil pollution, plant life typically stops thriving in these types of soils. Plants may become poisonous from inorganic aluminum-contaminated soil. Moreover, this kind of pollution frequently raises the soil's salinity, which makes it unsuitable for the development of plant life.

In a process called bioaccumulation, plants grown in polluted soil may collect significant amounts of soil pollutants. All the accumulated contaminants are transferred up the food chain when herbivores eat these plants. This may cause numerous beneficial animal species to disappear or go extinct. Moreover, these toxins have the potential to ascend the food chain and eventually appear as diseases in people.

2.8 Effect on the Ecosystem: Because the volatile toxins in soil can leach into underground water reserves or be blown by winds into the atmosphere, soil pollution can be a major source of air and water pollution.

Moreover, it can cause acid rain by releasing a significant amount of ammonia into the environment.

Many microorganisms that enhance soil texture and aid in the breakdown of organic materials are hostile to acidic soils. Consequently, the detrimental impacts of soil contamination also affect the texture and quality of the soil.

This type of pollution has a significant impact on crop productivity; in China, around 12 million tons of grain—worth roughly 2.6 billion USD—is discovered to be unfit for human consumption due to heavy metal contamination.

2.9 What are some ways to manage soil pollution?

In order to deal with soil remediation, several technologies have been created. The following is a list of some crucial methods used to clean up polluted soil:

Polluted soils are dug up and then transported to far-off, unpopulated areas.

The temperature is increased during thermal remediation to drive contaminants into the vapor phase, where they can then be recovered by vapor extraction.

Plants and microorganisms are used in bioremediation and phytoremediation to clean up contaminated soil.

My primary form of mediation includes the buildup of heavy metal pollutants via fungus.

CHAPTER THREE

WASTE MANAGEMENT SYSTEM

3.1 Waste Management System: Due to Bangladesh's vast, rapidly expanding population in a densely populated environment, waste management in Bangladesh faces various issues. Bangladesh has the ninth-largest population and the twelfth-highest population density in the world. In instance, a 3% increase in urban population is anticipated between 2010 and 2015. With this population growth, trash management is becoming a bigger issue, especially in the bigger cities. According to a UNFPA assessment, Dhaka is currently among the most polluted cities in the world, with the handling of municipal trash being one of the problems. There was no effort made to assure environmentally acceptable recycling of solid trash, such as paper, cartons, metal, plastic, pet bottles, and e-waste. However, a local business called Bangladesh Recycle (www.bdrecycle.com) has been working since 2018 to manage and digitalize solid waste recycling. A web app and an Android app are available from Bangladesh Recycle to purchase waste from businesses, families, and manufacturers. Bangladesh recycle collects waste, sorts it, and sends it to a factory end recycler who makes sure that recycling is done sustainably.

3.2 Landfill management: Amin bazar employs about 25 regular staff members to ensure the efficient functioning of the entire dump, and management is monitored by infrequent site inspections by representatives of the municipal corporation.

There isn't a landfill-in-charge officer on duty. This highlights certain managerial shortcomings when compared to the Matuail landfill, which employs 26 regular staff members, including three conservancy inspectors who work eight-hour shifts to supervise the landfill. According to the KII at Matuail, around 2000 tons of rubbish are disposed of every day, and in 2018 and 2017, almost 947,000 and 800,000 tons of waste, respectively, were thrown there.



Waste Disposal Equipment

3.3 Landfill waste disposal: According to study respondents, container carriers, compactors, open trucks, or dump trucks are used to collect municipal solid waste for landfill disposal from STSs in the DNCC and DSCC, respectively. Container carriers and open trucks are more frequently used in the DNCC. Each landfill receives garbage transfers from at least 500 to 550 trucks each day. Depending on the amount of debris, a compactor truck driver indicated that one to four trips to the Amin bazar landfill were required per day. Each waste-filled vehicle needs to travel 75 minutes or more to get to the dump from the STSs, while domestic waste travels 24 hours or more to get there.

The results of the observation checklist show that the STS waste-carrying trucks are weighed by the weighing bridge at the entrance of the landfills both before and after the garbage is dropped in order to determine the precise weight of the discharged waste. Manual entry is used to register the registration number. The DSCC and DNCC both keep track of and share this data. The waste in the dumping platform (a place within the landfill where it is spread out and dumped) is not separated before dumping.

At Amin bazar and Matuail, there are five and four dumping stations, respectively. Excavators, bulldozers, pay loaders, and dumpers are used to reposition and flatten the dumped garbage, and tyro dozers, chain dozers, and scrapers are used to distribute the material evenly.

3.4 Waste Creation: As of 2021, Bangladesh produces about 22.4 million tons of waste year, or 150 kg/cap/yea. By 2025, the rate of garbage production in Bangladesh is expected to increase and reach 47,064 tons per day.

In 2025, the rate of waste generation is anticipated to rise to 220 kf/cap/year. The lack of access to efficient trash disposal services by a sizeable portion of the populace will ultimately result in a waste management issue.

Just 37% of the rubbish is collected in big Bangladeshi cities like Dhaka. When waste is not properly collected, it will be illegally disposed of, endangering Bangladeshis' health and the environment.

3.5 Present government initiatives: Recently, Bangladesh has made improvements to trash management, particularly in metropolitan areas. With assistance from the Japan International Corporate Agency (JICA), Dhaka City Corporation is working on a master plan to improve solid waste management in the city. For instance, Social Business Enterprise Waste Concern has emerged to work with homes to address municipal garbage. Moreover, UNICEF has started waste management and recycling initiatives with municipalities, city corporations, and municipalities. Yet, there are now still not enough incentives to raise the bar of waste management across all elegant sectors, particularly for wastes.

3.6 Amin bazar waste to energy plant to be a game changer: LGRD minister; 3,000 tonnes of trash per day will be needed for the envisioned Amin bazar waste to power facility. Tazul Islam, minister of LGRD and cooperatives, claimed that if a power plant gathers this much trash, there won't be any more waste in the city (Prothom Alo English Desk).

Once the nation's first projected waste energy plant at Amin bazar in the capital is operational, Dhaka is anticipated to experience a fundamental shift in how it disposes of the over 6,000 tonnes of garbage it produces each day, according to news agency UNB. After the projected waste energy plant in Amin bazar starts producing electricity, there won't be any trash lying around the city. A daily 3,000 tonnes of waste will be needed by the plant. According to local government, rural development, and cooperatives minister Md. Tazul Islam, if a power plant collects this much trash, there won't be any more waste in the city.

The minister said this while touring Dhaka North City Corporation's Gabtoli mechanical workshop and Amin bazar disposal station (DNCC).

Tazul Islam, who called the waste-to-energy plant his "dream project," issued a warning that any irregularities and corruption would not be tolerated in the endeavor. He declared that an agreement would be made with a foreign company to carry out the power project. The firm requests extra time even though it must begin productions within 18 months of signing the agreement.

CHAPTER FOUR

NEGATIVE IMPACTS OF WASTE MANAGEMENT

4.1 Negative effects of waste management: Soil degradation is one of the worst effects of poo waste management. Municipal waste, in particular, increases the incidence and prevalence of diseases like malaria and respiratory issues as well as other illnesses through the contamination of groundwater. In such cases, agricultural land becomes polluted in addition to the dumping station, making it impossible to fertilize the land. According to a survey, 20% of biomedical waste in Bangladesh is thought to be highly infectious and dangerous since it is frequently dumped into the sewage system or sewers.

Landfills are a major source of methane emissions, which hasten climate change in most nations, including Bangladesh. Methane emissions from the Amin bazar landfill are equal to 190000 automobiles.

4.2 Land scarcity: Amin bazar occupies 50 acres, compared to the 99 acres of the Matuail dump. According to the Waste Database 2014, 388.5 acres of land are needed to absorb 8,646,120 tons of trash annually, or 23,688 tons per day for the entire city (Waste Concern 2014). It is critically necessary to acquire more land to manage the growing trash volume effectively. In this context, a significant stakeholder explained that: Land ownership and land availability are significant obstacles to effective waste management at landfills. The Matuail landfill requires 10 acres of land to dispose of over 1 million tons of rubbish; each day, the city produces about 3,000 tons of waste. Land shortage makes it more difficult to manage garbage. Due to exceeding their current capabilities, the waste management divisions of DNCC and DSCC both have plans to acquire property for the expansion of their respective landfills. Land purchase for Matuail and Amin bazar, totaling 81 and 80 acres, respectively, has started and is anticipated to be finished soon.



Waste spillovers affect agriculture in the Surrounding Area

4.3 Loss of Land: According to some FGD respondents, the lack of a landfill border wall causes waste to flow outside the permitted dumping area. Furthermore, the Amin bazar dump was built on private property that belonged to local villagers and was formerly used to grow "boro" rice. The government has not yet paid certain landowners for their property. Also, they are subjected to the detrimental externalities brought on by landfill activities. While the DNCC continues to be in control of the landfill, including managing all resource and financial matters, the JICA manages and monitors the Amin bazar landfill in conjunction with the municipal corporation. The Amin bazar dump was constructed in a low-flooding zone, which is prohibited according to land constraints, the respondents stated during the FGD. The Amin bazar operation is being challenged by the Bangladesh Environmental Lawyers Association (BELA). Significantly, it also criticized the government for trying but failing to preserve the buffer zone while the landfill's authorities were given 52 acres (21 hectares) but are currently using 73 acres (29.5 ha).

4.4 Soil Contamination: Pollution of the soil Local resident's farm crops informally in the Matuail waste. Although this provides the farmers with a second source of income, the heavy metal composition of the soil that may result from the enormous amount of waste that has been placed there poses a possible health concern. According to a representative of the Matuail landfill, the agricultural land nearby will look very different right after the winter because that is when the farmers will begin producing the crops. On the other hand, due to soil and groundwater contamination brought on by leachate permeation and rubbish dumping, residents who live close to the Amin bazar landfill are unable to plant crops. We have previously grown crops on this site, a FGD respondent said. Yet, today, polythene has been buried in that field next to the landfill. Now since all the fields are bare, we are unable to grow any crops. This study also found that numerous agricultural fields are situated within a 200–300 m radius of the Amin bazar landfill's dumping zone, which is a very dangerous area. Moreover, trash accumulates in agriculture, particularly during the monsoon, creating soil infertility.

4.5 Water contamination and a leachate treatment facility: The technique of this investigation prevented groundwater testing in a lab or by scientific means.

Leachate treatment plants have been installed at Amin bazar and Matuail to reduce leachate percolation into ground water, according to the observation checklists. Qualitative research, however, showed that leachate continues to damage groundwater. In Matuail, a leachate treatment facility was built in 2006. In the dumping platform, high-density polyethylene pipes are arranged in the shape of a fish skeleton to channel the raw leachate slowly into the leachate pond. The leachate water treatment facility at Matuail is divided into two sections, with the raw leachate being gathered in the raw leachate pond, according to the qualitative observation checklist. It passes through filtering before entering the semi-aerobic treatment pond. These two ponds are 15 meters deep. Three tanks filled with three different types of chemicals, including iron sulphate (FeSO_4), lime (CaO), and polymer, are used to treat the raw leachate using chemical oxygen demand and biological oxygen demand. A blower motor continuously blasts air into the semi-aerobic pond where fish and bacteria are cultivated to cure the water. Following a fish test for water toxicity to determine its suitability for crop production, the clean leachate from Matuail is transferred to a nearby piece of land. It passes through filtering before entering the semi-aerobic treatment pond. These two ponds are 15 meters deep. Three tanks filled with three different types of chemicals, including iron sulphate (FeSO_4), lime (CaO), and polymer, are used to treat the raw leachate using chemical oxygen demand and biological oxygen demand. A blower motor continuously blasts air into the semi-aerobic pond where fish and bacteria are cultivated to cure the water. Following a fish test for water toxicity to determine its suitability for crop production, the clean leachate from Matuail is transferred to a nearby piece of land. This leachate treatment facility assists in cleaning the leachate and transforming it into potable water. Pipes are used to recover the raw leachate from the garbage and transport it to the leachate treatment facility canal. Using hydro-smart technology, the raw leachate that has accumulated in the raw leachate pond is reduced to smaller particles and chemically treated with FeSO_4 and CaO . Following the breakdown, a separate tank is used for the coagulation and flocculation procedures. The water is further filtered in an aerobic pond after the initial filtration. At the aerobic treatment facility, air is continuously blown as bacteria are cultivated to treat the water. After being cleaned, the treated water is put through a dissolved oxygen test and, if successful, is allowed to rejoin the general water supply. Due to the mixing of precipitation and leachate water during the monsoon, it is difficult to properly manage the leachate pond.

According to in-depth FGD research, the leachate and trash that mix with the ground water have a negative impact on the nearby water bodies, decimating the fish population and making it difficult for fishermen to make a living. Leachate treatment facility operations are good, according to landfill officials. Unfortunately, the leachate treatment facility does not completely minimize leachate percolation into the local waterbodies, making them contaminated

And unsuitable for human use, as evidenced by observations from the communities around the Amin bazar landfill and the remarks of the FGD respondents.

As a result, some farmers and fishers have been compelled to change careers. To lessen harmful environmental and health effects, the current leachate percolation system needs to be improved.

4.6 Incineration of Waste: Waste incineration Officials at the landfill declared that waste incineration is not allowed. Nonetheless, FGD respondents noted that they could see the landfill site and smell smoke from burning trash. According to a KII reply from the landfill, "No, we don't burn any rubbish here, and if it ever catches fire, we take prompt action to stop the fire." It takes roughly two to three days to contain a fire if it is not doused within an hour. The trash generates methane gas, which causes the fire to spread swiftly and deeply for a distance of around 3 to 4 feet. However, many who reside around the landfill voiced the following opposing opinion:

Indeed, occasionally the waste burns, catches fire, and it appears that the wind is blowing in that direction. During those times, you cannot remain in the house due to the horrible odor that comes from the waste.

The authors' visit to the Amin bazar landfill revealed spontaneous rubbish combustion, which supported the aforementioned result. The harmful smoke produced by this combustion is unhealthy for people who live and work close to landfills. Recently, the local government launched an effort to build a trash-to-electricity facility in Amin Bazaar, which will require 3000 tons of rubbish everyday and help to consolidate the city's dispersed waste. The project's viability is now being evaluated by the JICA.

Unfortunately, it is still difficult to guarantee the quality of the energy because of the lack of waste segregation.

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DNCC has started a project with the China Machinery Engineering Corporation to build a 42.5 Megawatt power plant at the dump to produce electricity by incinerating the waste at a high temperature, it was discovered during the landfill tour.

CHAPTER- FIVE

Regulatory framework on prevention of soil pollution

5.1 Regulatory Framework for Soil Pollution Prevention: Like to many other nations, the government of Bangladesh has created a number of legislative frameworks and rules to stop soil pollution. The government's initial effort to stop environmental contamination was the Water Pollution Ordinance of 1970. After the government created the Environmental pollution Control Ordinance in 1977, this ordinance was repealed. The law now includes provisions for environmental pollution control, prevention, and abatement. The ordinance was repealed later in 1995 when the Bangladeshi government passed the "Environmental Protection Act 1995." The Bangladesh Environmental Protection Act of 1995 includes provisions for pollution control and mitigation as well as for the conservation and enhancement of environmental standards. According to this law, environmental pollution is defined as any activity that damages the environment by releasing liquid, gaseous, solid, radioactive, or other substances into the soil, air, water, or any other component of the environment. It also includes any change to the temperature, taste, density, or other characteristics of soil, air, or water. This Act also suggests a few strategies to reduce environmental pollution. Additionally, it requires both individuals and organizations to follow those rules.

Any person who has been harmed or is likely to be harmed as a result of pollution or environmental degradation may apply to the director-general of the Department of the Environment for the remedy of the discharge or anticipated damage in accordance with the rules, according to Article 8 of the Bangladesh Environment Conservation Act, 1995. Any factory that produces toxic waste is required by law to set up an effluent treatment facility to remove waste before it is disposed of in rivers or other bodies of water.

Additionally, it mandates that each factory obtain a clearance certificate from the EPA. Despite the act's explicit requirements, the majority of the nation's manufacturers failed to set up wastewater treatment facilities or obtain approval from the relevant authorities, and they continued to contribute to other forms of pollution.

Also, this nation set up an environmental court to prosecute offenders. Soil pollution can be decreased with proper legal enforcement of the regulations.

The 2017 Bangladesh Biodiversity Act. The purpose of the Act is to guarantee the preservation of biodiversity, the sustainable use of its elements, and the just and equal distribution of benefits resulting from the use of genetic resources. According to Section 18A, the state must work to safeguard biodiversity, preserve natural resources, and protect the environment. Forests, wetlands, and wildlife for today's and tomorrow's citizens.

Every local body must establish one within its jurisdiction in accordance with Section 41 of the Act in order to promote the conservation, sustainable use, and documentation of biological diversity, including: habitat preservation, conservation of landraces, Folk varieties, and cultivars.

5.2 Rajuk and the City Corporation's legal battle was unsuccessful: Locals warned about the severe effects of environmental damage during the property acquisition. "At the time, government representatives told us that the landfill would be sanitary and safe. But you smell bad even at my house, which is half a mile away," complained Farid, lamenting the fact that a writ petition he and Bela filed in 2006 to stop the landfill was still pending at the High Court. The court requested an evaluation report from Bangladesh University of Engineering and Technology in the most recent update in 2010. Lack of funds was stated by Rajdhani Unnayan Kartripakkha and the municipal corporation as the cause for not receiving the report by the deadline (four months). For the unsubmitted report, the court imposed additional orders. As the writ petition was being heard, the court's jurisdiction altered.

5.3 Environmental action by the City Corporation; A DNCC waste management official who wished to remain anonymous revealed that the authority has plans to purchase an additional 100 acres at Amin Bazaar for garbage management.

The official said that after being made aware of the complaints of the villagers regarding pollution and cheap land prices, proper compensation would be provided this time, and steps would be done to control pollution. He did not go into detail about what constitutes adequate remuneration, though. Regarding containing pollution, he stated that vent pipes would be put in place to discharge gas from the landfill through a controlled channel and that dirt would be sprinkled on top of the trash to keep vermin and birds away from the waste. For the past six months, leachate has been extracted from the waste piles and treated. The DNCC representative added that things would become better around the landfill in the following two years. It's time to find out whether the promises will be fulfilled this time or not. But, the harm already done is irreparable. Amin bazar landfill, according to AH Maqsood Sinha, executive director of Waste Concern, is an uncontrolled dumping site that falls far short of the requirements of a sanitary landfill. Waste Concern works to improve waste management and recycling in the nation. The less expensive option might be a controlled landfill where a layer of Instead of an impermeable liner, clay is put to the floor and sidewalls of sanitary facilities. Preventing leachate from soaking into the soil and damaging landfills surface and groundwater. According to Sinha, once the water supplies are contaminated, it would require a thousand years to undo the harm.

CHAPTER SIX

Data analysis and presentation

6.1 Participation Re- examined: Amin Bazar Dump Station has been re-evaluated I went there to collect primary data, so I spoke with Amin Bazar dump station employees as well as local farmers and other rural residents. I also have a query.

I started by asking if there had been any alterations made to the garbage station.

The majority of them have replied "yes."

How much modification is needed for the dump station?

They said that prior to the construction of this dump station, rice was planted and produced in large quantities, which is no longer possible. Fishermen used to catch fish during floods during the rainy season in the village that was next to the dump station since the dump station's foul odor permeated the entire community.

So, I inquired once more: Are these changes at the disposal station positive or negative?

They all responded negatively when I asked this question.

Then, I'd like to know from them what sort of adverse effects have occurred here.

The majority of farmers claimed that this dump station daily reduced soil fertility and that the soil in an area of around 300 to 400 feet was completely damaged, making it impossible to cultivate crops there. Maybe 50 persons that I spoke with—workers, farmers, fishermen, and rural residents—all mentioned the drawbacks of this garbage site.

They added that this garbage site is seriously damaging to the ecosystem.

The dangers facing villagers now, local brick kilns and manufacturers are forcing farmers and fishermen to work as day laborers and factory workers. They blame the government for taking their land and removing their source of income more than anything else. In 2005, the then-Dhaka City Corporation purchased the land for the dump site in defiance of locals' vociferous protests that they had been paid significantly less than the land's going rate at the time.

Abul Bashar, a 60-year-old man, is one of them. His 65 decimal points of land were dumped in a landfill. He now grows crops on rented property, which is a challenging task given that he must remove polythene, porcelain shards, and shattered plastics from the soil prior to planting. One of my feet was punctured by a needle in the final week of January," Abul stated, pointing to the wound and cuts caused by sharp objects on his foot. At a tea shop on the border of the low-lying agricultural regions, where the ground sloped upward to make space for housing, a few other farmers were gathered while he spoke. Standing there, one can see piles of garbage in the center of the Dhaka Metropolitan Development Plan's sub-flood flow zone.

The plan defines flood plains so that they can be preserved and used as a natural drainage system. Farid Ahmed, who is 68 years old, suffered the most land loss. He said that his family alone controlled one fifth of the land at the disposal site.

Farid owns 100 decimals and even an extra 21 acres that the Dhaka North City Corporations is now exploiting for rubbish dumping without purchasing. A DNCC official in charge of trash management confirmed using undesignated property for the landfill. greater than 3,000 tonnes

Every day, trash is thrown into the landfill. The local water supplies will also be contaminated if the garbage spills over. Locals claimed that since the garbage dumping started, the water quality of the neighboring Karnapara khal has rapidly declined, with industries and brick kilns already contributing to the pollution. Shambhu Rajbangshi, a local, remarked as he stood at the back of his home, just a few steps from the canal flowing downstream, "No fish can survive in this dirty water. He once had success when fishing in this canal, and he constructed a concrete home. He primarily works now on other people's fish farms. He purchases fish from Dhaka's New Market when there is no work to be done and sells them in the neighborhood.



Since 2005, the city of Dhaka has been using a wetland area for wetland areafor waste dumping. Supported by international cooperation. This has violated environmental laws and caused damages to the soil ecosystem and Agriculture.

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6.2 Data Presentation and Analysis: Using qualitative and spatial methods, this study described the general situation of Dhaka's two landfills. Together with the leachate treatment and management procedures of the landfills, it examined the waste management procedures at the Mutual and Amin bazar landfills' effects on the environment and human health. The inclusion of such broader thematic areas sets it apart from other research and contributes to the expanding body of knowledge on the handling of landfill garbage. To assess the impact of the landfill on the nearby features, a multi-ring buffer zone was established. One important factor in determining exposure is the vicinity to various land cover elements. The qualitative findings suggesting landfill pollutants have an impact on the nearby agricultural and water bodies, highways, and settlements further support this.

A landfill must be situated 250–300 meters away from ecosystems, according a guideline (Central Pollution Control Board, 2017). Roads and waterways must then be 200 meters away from the landfill. Within 300 m of the reported landfills, however, were water bodies and agricultural lands, both of which are quite vulnerable to pollution. There were discovered to be towns and roads inside the 500 m buffer zone. The settlements and highways were substantially closer to the disposal site, particularly in the Mutual landfill.

The research cited above also emphasized how severely exposed terrain features and settlements are Contaminants from the nearby landfill are present. Due to an inadequate amount of available area and workers, improper management techniques at the Amin bazar dump were discovered. The danger of health problems among the local population is increased by improper waste management, a foul odor, and the presence of mosquitoes, flies, and other animals. An earlier study with a focus on Rawalpindi, Pakistan, revealed the inadequate municipal SWM system brought on by a lack of appropriate resources. The research cited above also emphasized how severely exposed certain terrain features and habitations are landfill contaminants are present just nearby. Due to insufficient land availability and employee numbers, improper management methods at the Amin bazar dump were discovered. The danger of health problems among those in the area is increased by the lack of effective waste management, the prevalence of foul odors, mosquitoes, flies, and other animals. The inadequate municipal SWM system in Rawalpindi, Pakistan, was previously studied with a focus on that city's lack of funds and appropriate equipment.

Although incineration reduces trash volume and is a step toward successful waste management, it has substantial negative health effects, such as a higher incidence of cancer and respiratory problems. Also, it increases carbon emissions, acidification, the production of heavy metals, and the disposal of toxic ash, all of which have a negative impact on the environment and expose more people to dangerous chemicals (Sharma et al. 2013).

It was determined that a lack of funding was the biggest barrier to implementing effective SWM techniques. Similar to this, a prior study found that inadequate municipal SWM in Bangladesh is hampered by a lack of landfilling processes, financial constraints, and poor technological choices (Abedin & Jahiruddin 2015). More recent studies revealed a substantial correlation between environmental or health hazards and the lack of equipment for waste management operations and management planning (Ferronato & Torretta 2019).

According to the research on waste leachate treatment, treatment facilities reduced pollution levels by purifying the leachate, but the percolation method and mechanism did not include safeguarding the groundwater or neighboring agricultural land from pollution. Earlier research demonstrated that the leachate from a landfill site contaminated the nearby soil, surface water, and groundwater (Azim et al. 2011; Bhuiya et al. 2002). Azim et al. (2011) discovered locals and fishermen cultivating fish in the nearby low-land sections of the Matuail landfill's southern and eastern locations. This investigation could not find any evidence of such a technique, which may be because fish farming is now illegal due to severe water pollution.

Several comparable studies (Haque et al. 2013; Hossain et al. 2018), confirming the findings, showed that land near to landfill areas, typically used to raise crops by the local people, may accumulate harmful compounds from the decomposed trash and leachate from the dumping site. The results of this study are supported by earlier research on the Matuail landfill, which demonstrated that leachate overflow may damage surrounding crops (Hossain et al. 2018). Due to significant rainfall generating a larger flow of drainage water/leachate during the monsoon, there is an especially high risk of polluting the nearby lowlands (used for agriculture and fishery).

Moreover, this study found that there is less crop production nearby the Mutual landfill than had been reported in other studies.

Due to uncovered garbage, odor pollution was noted. The state of the air is threatened by this. Moreover, it encourages the reproduction of pests like flies and mosquitoes.

The awful landfill odor forced many residents who were residing next to the Amin bazar landfill to move. These conclusions are reinforced by a study with a South African emphasis (Njoku et al. 2019), which found that some residents living close to the dump regularly kept the doors and windows of their homes closed to keep mosquitoes and rats out. Danthurebandara et al. (2012) also discovered that individuals do not want to live next to landfills because of the disturbance caused by the flies, odor, smoke, and noise.

Due to the manual segregation of waste without the use of protective gear, workers at the Dhaka dump are at danger of several injuries and health risks. According to Ang et al. (2013), the manual method of sorting garbage provides a high risk of contracting infections, which supports the health risk. Several FGD participants claimed that the landfill waste management procedures have a negative impact on the health of the people who live nearby. The majority of those employed at the dump and those living nearby have health conditions include pneumonia, skin rashes, appetite loss, headaches, and stomach issues. Norsal'adha et al. (2020), Njoku et al., and other researchers validate these conclusions. (2019) and Vrijheid (2000) found that people living close to open dump sites experienced eye irritation, skin rashes, nasal irritation, headaches, excessive fatigue, excessive day sleepiness, sore throats, diarrhoea, and stomach aches, as well as illnesses like asthma, tuberculosis, pneumonia, typhoid fever, dengue fever, cholera, food poisoning, cancer, hepatitis A, epilepsy, hypertension,

CHAPTER SEVEN

Findings and recommendation

7.1 Findings: The fundamental drivers of global economic and social development, rapid urbanization and industrialization, are connected to increased waste generation.

To achieve resource conservation, environmental protection, and protection of the public health, garbage must be controlled. The collection, transportation, recovery, and disposal of waste are all included in the definition of waste management, as well as the oversight of these processes and maintenance of disposal facilities like landfills.

Currently, the most popular way to dispose of waste is through landfills. A landfill is a sizable plot of land or an excavated site created especially to serve as the location for the final disposal of solid municipal waste.

Worldwide, 37% of garbage is disposed of in landfills, with the US accounting for 52.6% of this total, followed by Brazil at 59.1%, Malaysia at 94.5%, China at 79%, and Bangladesh at 42%.

According to research, the disposal of garbage in landfills results in hazardous organic compounds, foul aromas, bio aerosol emissions, and surface and groundwater contamination from landfill leachate. Aquifers are severely harmed when landfill leachate leaks into groundwater or surface water due to holes in the liners. In many developing Asian cities, like Dhaka, Bangladesh, handling the rising amounts of solid garbage produced by the expanding urban population has proven to be a major challenge. A large amount of waste is being generated in Dhaka, which has a restricted waste management infrastructure.

About 4500 tons each day (Mahmud 2018). The Dhaka South City Corporation (DSCC) and the Dhaka North City Corporation (DNCC) are currently served by two landfills located in Mutual and Amin bazar, respectively. Until 2006, the Japan Foreign Cooperation Agency (JICA) and Japan Debt Cancellation Fund had only established the Mutual landfill (under the DSCC) (JDCF). Another landfill was constructed in 2006 with financial support from the JICA at Amin bazar (under the DNCC), and it is still in use today despite having reached capacity in 2017. The JICA engages with both the DNCC and the DSCC about waste management activities carried out in the dump but is not in charge of any landfill operations or management activities. This financing was granted as help.

7.2 Recommendation: The results show that there is need for improvement in the organization and efficiency of the city of Dhaka's current soil waste management (SWM) procedures. To promote environmental sustainability and equitable public health, the current waste management system needs to be modified. Better primary trash disposal techniques are required to reduce the amount of waste at the landfill. The media, including newspaper ads, billboards, pamphlets, and leaflets, must be used to raise awareness among those involved in waste activities of the negative effects of the uncontrolled dumping of solid waste.

Campaigns for education, environmental cleanup, and recycling can all raise awareness. Recycling provides raw materials for the creation of new products while also conserving energy and keeping waste out of landfills and incinerators.

Recycling is the next best thing if trash cannot be avoided. Studies in the past have demonstrated that the comprehensive use of all media can raise public interest in solid waste recycling (Omran et al. 2009). Many local governments, including California, which imposes a maximum daily penalty of US\$70,000 for improper hazardous waste disposal, use penalties for improper SWM practices as a suitable alternative. In a UN-Habitat report, this is also noted as a potential advantageous technique for low-income nations like Bangladesh (Adom & Kwach 2012). Leachate from landfills must be kept from leaking and mixing with the nearby river and farmland, maybe by erecting a permanent protective barrier.

To regulate the flow of the leachate, a suitable basement and leachate suction are also required. Also, it is necessary to strengthen the organizational capabilities of the landfills by providing adequate technical and human resources as well as securing adequate funding for effective SWM practices. The existing aerobic leachate treatment procedure must also be improved using low-tech, straightforward, and creative techniques. Although it is necessary to expand the landfill's land area, the new space will run out in five to seven years as a result of the growth in garbage production caused by an aging metropolitan population. Waste reduction and waste disposition-adjusted waste treatment and recycling are required. Consideration should be given to the effects of alternative procedures like as incineration and the production of refuse-derived fuel (RDF), particularly on the environment and human health. The only garbage that should be disposed of in a landfill is the residue left over after composting and Burgess conversion.

RDF and incineration plants should be established, according to Ganesh et al. (2013). They discovered that managing municipal garbage with RDF results in a more environmentally friendly environment. The hardship of utilizing fossil fuels in Bangladesh can also be lessened by this method. This can cut the amount of waste disposed of by 20% and increase the service life by up to 20–25 years. The landfill administrators should set up a formal recycling biogas facility to further minimize garbage.

Middlemen should be eliminated from the system, and the workers at this plant must fall under the jurisdiction of the city corporation. Employees may be hired based on their skill and the number of dependents they have; nevertheless, vulnerable persons (pregnant, unwell, or elderly people) and children should not be permitted to work in hazardous recycling operations. The smell of landfill gas (LFG) can give surrounding people and landfill employees headaches and nausea. The major component of LFG, methane (CH₄), is easily usable as natural gas. To achieve environmental sustainability, landfills must collect and transform LFG into a renewable energy source. To lessen and eliminate the smell of the landfill, environmentally friendly treatments such as composting in tunnels, turning garbage into fertilizer, and eco-friendly leachate treatment should be implemented. Denton, Texas's unique environmentally friendly landfill that includes "mining" could be an excellent model for Bangladesh. In order to discover recyclable metals, plastics, and other things within the long-standing tip or waste pile at this dump as well as to minimize soil contamination, a machine is used there. Also, this landfill features a unique organic waste treatment facility where the created methane is collected and used to generate electricity for about 1600 families (Newton 2016). It is important to take action to solve environmental issues in order to lessen the unchecked breeding of rodents, birds, and insects like flies and mosquitoes. By giving landfill workers the proper safety gear, such as masks, gloves, and protective boots, health risks should be reduced. Jerie (2016) discovered that despite being provided with safety equipment, employees might not use it owing to discomfort or lack of awareness of safety concerns. The key problem remains the enforcement of the laws, despite regular training programs being done to educate trash handlers about the value of safety gear through government, non-government, and collaborative activities.

The central government is in charge of creating the appropriate rules and regulations, but city corporate authorities are in charge of carrying out the action plans associated with those policies and laws. This creates bureaucratic obstacles.

To ensure correct use of safety equipment, the given equipment should be pleasant and convenient, with regular training programs and monitoring activities.

CHAPTER EIGHT

Concluding Remarks

8.1 Conclusions: Strategies for managing urban garbage must fully account for the intricate interactions that take place with various urban systems. Urban waste management techniques and policies may be harmful to the environment and the soil. According to the study's findings, there are greater environmental and soil pollution hazards for people who live close to the Dhaka dump sites under study. Although these landfills have made progress in recent years, further development is required if garbage is to be treated in a sustainable and healthy way. This information can help the public and urban decision-makers in Dhaka realize the importance of enhancing soil health and sustainability.

References:

Bhadra, S. (2019): Amin bazar's wasteland story. The Business Standard, 07.10.2019.

Jahan, E.; Nessa, A., Hossain, F.; Parveen, Z. Characteristics of municipal landfill leachate and its impact on surrounding agricultural land. Bangladesh J. Sci. Res. 2016, 29, 31-39

Devnath, B. (2020) Amin bazar, the landfill that ruined lives. The Business Standard, 11.03.2020.

Zahur, M., Otoma, S. (2013): Informal Waste Recycling Activities: A Case Study of Dhaka City,

Bangladesh. Proceedings of Annual Conference of Japan Society of Material Cycles and Waste

Management. Session ID: FA-5.

Alam, M. S., Han, B., Mizan, A. and John, P. 2019. Assessment of Soil and groundwater and Health, doi: 10.

Alamgir M. and Ahsan. A. (2007). Municipal Solid Waste and Recovery Potential: Bangladesh

Iran. J Environ. Health. Sci. Eng., 2007, Vol. 4, No. 2 pp 67-76

Bhuiya. G. M. J. A (2007). 1. Bangladesh. Solid Waste Management: Issues and Challenges in Asia, pg 29-41.

Memon. M. A. (2017). 1. Solid Waste Management in Dhaka, Bangladesh. Innovation in Community driven Composting.

Kamal, A.K.I.; Islam, R.; Hasan, M.; Ahmed, F.; Rahman, M.A.T.M.T.; Moniruzzaman, M.

Bioaccumulation of Trace Metals in selected Plants within Amin Bazar Landfill Site, Dhaka, Bangladesh. 2016, 3, 179-194.

Hoque, M.A., Mondal, M.S.A. Seasonal Effect on Heavy Metal Concentration in Decomposed solid Waste of DNCC and DSCC Landfill Sites. Civ. Eng. 2014, 2, 52-56.

Kabir, M.R. Municipal Solid waste management system: A study on Dhaka north and South City Corporations. Bangladesh Inst. Plan 2015.

Alam, H. Second Modern Sanitary Landfill at Amin Bazar Awaits Green Signal. The Daily Star.

2021. Available online: (accessed on 19 January 2023).