

SOIL POLLUTION—A CONSEQUENCE OF ENVIRONMENTAL MISDEEDS: BANGLADESH CONTEXT

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ABSTRACT

Soil is the most precious and non-renewable resource in the world, and the main source of life for all living beings and resources. As no living thing on earth can be imagined without soil, it is the source of minerals, gases, liquids or solution and nutrients that support life. On the other hand, this soil can be a curse if it is polluted. This study indicates that there are 30,000 manufacturing factories are operating in Bangladesh and they are using at least 40 different types of chemicals in their operations. Owing to environmental pollution and related causes in Bangladesh, about 234,000 people, including 80,000 in urban areas, died in 2019, making it one of the most-affected countries in the world. The existing environmental legislations in Bangladesh are not sufficient to stop soil pollutions and the lack of implementation of these laws made the situation worst. Against such a background, the prime objectives of this article are to review the causes of soil pollution in Bangladesh; to determine the effects of soil pollution; to review the existing legal frameworks and to make recommendations to stop the pollutions. The paper makes use of secondary data *i.e.* books, articles, different national and international law reports, Acts etc.

KEY WORDS : Soil pollution, Bangladesh, Man-made pollutants, Natural pollutions, Agricultural practice.

INTRODUCTION

Soil is the most valuable resource and the ultimate source of nutrients for all organisms in the ecological system. As soil keeps our environment in balance, it also keeps harmony between living and non-living things. The extreme greediness of human being towards nature and their indiscriminate and cruel acts on the earth have already ruined the sanctity of the soil. These human acts of distortions in nature especially the soil is considered as a deserted environmental crime. The alarming news is that one-third of soil in the globe has already been degraded. So it is crucial for us to determine how gravely hazardous industry wastes have polluted soil in recent years. We already know that a large amount of solid waste including plastic materials and chemical products dumped over on the surface. Though the amount of the per capita solid waste in Bangladesh is small, the total volume of growing solid wastes is quite substantial. Nearly 45% of the

total solid waste is generated by only households (Hashem et al., 2017). As per different studies, the waterlogging in the country's major cities, including Dhaka and Chattogram, are created mainly due to implausible management of solid waste that conclusively affects the soil. The use of large amounts of inorganic fertilizer and pesticides reduce soil fertility and damage soil composition, another major cause of soil pollution. Besides, brick kilns are another source of soil pollution in Bangladesh. Fertile topsoil of agricultural land is used as the main ingredient at the brick kilns in which around 3-kilogram soil is used for one brick (Islam *et al.*, 2020). Agriculture land is constantly declining due to various destructive activities of the human being. As a result, arable land is degrading and decreasing, as is the environment, which poses a serious threat to future food security and livelihoods in the country. However, this is the time to achieve the sustainable development goals (SDGs) where Bangladesh must adopt and implement various

policies so that all development activities in the country are carried out in the light of those policies.

SOIL POLLUTION: GENERAL MEANING

In general, soil pollution is described as the presence of toxic chemicals in the soil that poses a risk to human health or the environment. In the case of pollutants that exist naturally in the soil, even though their levels are not high enough to pose a risk, soil contamination is often considered to occur if the contaminant levels in the soil surpass the levels that would naturally occur. As part of the land degradation, soil pollution or soil contamination is caused by the existence of oxidative metabolism (human-made pollutants) or another impact on the natural soil which usually caused by industrial production, agricultural chemicals, or unsuitable waste disposal (Alam *et al.*, 2019). Petroleum hydrocarbons, polycyclic aromatic hydrocarbons (such as naphthalene and benzo (a) pyrene), solvents, pesticides, lead, and other heavy metals are the most prevalent chemical substances are the culprits for soil pollution.

CAUSES OF SOIL POLLUTION

Soil, whether it is contaminated or unpolluted, contains a number of compounds (contaminants) naturally. These substances include metals, inorganic ions, and salts (e.g. phosphates, carbonates, sulfates, nitrates), and other organic compounds such as lipids, proteins, DNA, fatty acids, hydrocarbons, PAHs, alcohols, etc. (Shaikh *et al.*, 2008). There are numerous causes of soil contamination and these are due to natural or man-made (ethnographic) reasons.

(i) Man-Made Pollutants

Man-made soil pollution is an outcome of deliberate (industrial) and accidental activities of humans. The man-made pollution coupled with natural processes increases the harmful pollutants in the soil.

The man-made pollutants include

Accidental leaks or spills of gasoline, diesel and other chemicals during storage or transport

- Manufacturing products with boilers, resulting in the possible dispersion of contaminants in the environment
- Mining activities — raw materials crushing or processing — that emit toxic substances Use of

herbicides, pesticides and other insecticides and fertilizers in agricultural activities

- Toxic gas emissions for vehicles
- Dumping chemical waste accidentally or deliberately in landfills, which can flow into groundwater or create contaminated vapors.
- Construction activities are the major cause of soil pollution in urban areas. Cracked paint chips falling from building walls, especially lead-based paint pollute environment especially the soil. Any chemical substance used in construction sites also may pollute the soil.

(ii) Natural Pollutants

The natural accumulation of chemicals is one of the sources of soil pollution. This processes may also influence toxic material released by the human into the soil (Alexander, 1999). The presence of different natural elements in the soil interacts with the man-made pollutants, increasing the pollutant or toxicity level in the soil.

Natural soil pollutants

—Imbalances between atmospheric deposition and leaking away with precipitation water. For example, increase and accumulation of perchlorate in the soil in a dehydrated environment.

—Natural creation in soil under certain environment using energy generated from the thunderstorm, natural formation of perchlorate in the soil in presence of chlorine and metallic object.

—Leaks from sewer lines into the subsurface, adding chlorine which could generate trihalomethanes (chemical compounds in which three of the four hydrogen atoms of methane are replaced by halogen atoms) such as chloroform.

THE EFFECTS OF SOIL POLLUTION

Soil pollution is affecting plants, animals, humans, and even the entire ecosystem. Although everyone is in risks due to the adverse impact of soil pollution, it affects people irrespective of their age and health condition.

Major soil pollution after-effects are:

(i) Diseases Caused by Soil Pollution

Human beings may be affected by inhaling gasses emitted from upward-moving soils, or by inhaling matter ferried by the wind due to the various human activities on the soil. Soil pollution can lead to various health problems, including headaches,

nausea, fatigue, skin rash, eye irritation, and potentially resulting in severe complications such as neuromuscular blockage, damage to the kidneys and liver, and various cancers. Due to environmental pollution and related health risks, around 234,000 people died across the world in 2019. Of them, 80,000 victims were from urban areas (The Independent, 2019).

(ii) Inferior Crop Quality

Due to soil pollution, the production and quality of crops decrease alarmingly. Regular use of fertilizers, inorganic fertilizers, pesticides diminishes soil fertility at a rapidly and change soil structure, resulting in poor crop quality (Abdel and Mansour, 2017). Owing to the deposition of harmful chemicals in vast concentrations, the soil may become less nutritious over time. If the soil is polluted, it may pollute home-grown vegetables and fruits too and other crops too.

(iii) Water Sources Contamination

After the rain, the surface water run-off carries the polluted soil and enter various water body. It could, therefore, contaminate the underground water which causes pollution of the water. Regardless of the presence of harmful contaminants in the water is not safe for both human and animal consumption.

(iv) Negative Impact on Ecosystem and Biodiversity

Soil contamination may distort the soil environment. The soil is a major source of food and the homes of animals, reptiles, mammals, birds, insects, and various types of microorganisms (Allende and Monaghan, 2015). Soil emissions may have a detrimental effect on living organisms 'existence, which may result in certain species' slow deaths. It can cause health threats to animals.

MEASURES TO PREVENT SOIL POLLUTION

Strict regulations need to be enforced to reduce and avoid soil contamination. So, effective laws and regulations are very important, considering the far-reaching consequences of soil contamination. The existence of the animals and plants fully depends on the soil. Usually, the soil is considered as the wealth of farmers (Alam, 2009). Land deficiency is not only a loss to farmers but also the economy, human health, organisms of the country. In Bangladesh, therefore, there is a need to adopt rules and regulations to contain soil pollution.

(i) Domestic Waste Control of Soil

The level of soil pollution is continuously increasing due to the dumping of household waste indiscriminately. So, deliberate and specific strategies are needed to combat the soil pollution. The greater part of household waste is organic waste (Khan and Siddique, 2000). So, we have to manage household waste appropriately. To stop soil pollution in Bangladesh, household waste should be managed properly and reduced the production of organic waste. Similarly, proper management of industrial waste is also significant to stop pollution. Strict guidelines for the proper disposal of toxic waste are needed and strict adherence to them must be ensured. The garbage produced in the factories should be treated in the purifying plants.

(ii) Recycling and Reuse

To reduce the pollutants in soil, the focus should be on recycling and re-use of the household and other items in Bangladesh. For example, if anyone wants to dump old furniture, before doing that, he or she should consider whether it can be modified or reused. Like the furniture, the waste of different products can also be recycled in the house to prevent soil pollution. Household waste that was dumped in landfills increases the amount of carbon in the soil, which is a major cause of soil pollution (Alam, 2009). So, to protect the soil from pollution, it is very important to recycle and re-use of household equipment and waste.

(iii) Other Measures

- Fundamental properties of soil should be strengthened by adopting Integrated Plant Nutrient Management to limit the use of chemicals in life.
- To improve the salinity-rich soil, different chemicals like gypsum and pyrites can be used as per the prescription of scientists. To reduce waterlogging in farms, the drainage system is very essential.
- Soil erosion can be prevented through stopping deforestation and forest erosion and implementing a soil-conservation process to conserve its nutrients.
- Regulations on land use like zoning will reduce the soil erosion issue.
- It's also necessary to build and enforce the schemes required to protect the land which is devastated by floods.

- Focusing on land use and crop management is essential.

Regulatory and Institutional Framework on Prevention of Soil Pollution

Like other many other countries, Bangladesh government has formulated some legal frameworks and regulations to prevent soil pollution. Water Pollution Ordinance 1970 is the first initiative of the government to prevent environmental pollution. This ordinance was repealed after the government formulated the Environmental Pollution Control Ordinance in 1977. The provisions to the control, prevent, and abate environmental pollution have been incorporated with the law. Later in 1995, the Bangladesh government adopted the "Environmental Protection Act 1995" repealing the ordinance. In the law, the government incorporated the provision for the conservation and improvement of environmental standards, and control and mitigate environmental pollution (Bangladesh Environmental Protection Act, 1995). This law defines, the environment pollution as the contamination or alteration of the physical, chemical or biological properties of soil, air or water including change of their temperature, taste, density or any other characteristics or such other activity which, by way of discharging any liquid, gaseous, solid, radioactive or other substances into the soil, air, water or any other component to the environment destroys or causes injury or harm to public health. This Act also recommends certain measures to prevent pollution and gives some outlines to heal environmental pollution. It also mandates individuals and organizations to abide by those provisions.

Article 8 of Bangladesh Environment Conservation Act 1995 states any person affected or likely to be affected as a result of pollution or degradation of the environment may, in the manner prescribed by rules, apply to the director-general of the Department of Environment (DoE) for the remedy of the discharge or apprehended damage. According to the act, every factory with toxic waste must have to install an effluent treatment plant to treat waste before they get dumped into rivers or water bodies. It also states that every factory must have to take a clearance certificate from the DoE. Despite the clear instructions in the act, most of the factories in the country did not install effluent treatment plants or take clearance from the authorities concerned and complied with other

directives yet.

EFFECTIVENESS OF REGULATORY AND INSTITUTIONAL FRAMEWORK

The legal framework, formulated in the country decades back, is not enough to address the present issues over environmental pollution (Faruque, 2017). While the legal framework is very weak, the implementation of the law is also poor. The reluctance of the authorities concerned in soil resource management is one of the main reasons behind the failure of soil prevention in the country. To limit the uninterrupted relentless pollution of soil, the legal and institutional frameworks should be defined clearly and properly. Besides, good governance in soil resource management, which is very crucial to prevent soil pollution, must be ensured properly. The lack of effective laws is a great barrier to address the crisis. It is unfortunate that despite the existence of weak legal frameworks, these are not being implemented properly due to lack of effective measure and lack of good governance. Besides, bureaucratic decision-making process and irregularities in implementing the laws are also encouraging soil pollution.

Meanwhile, there is no separate regulatory body to addresses the issues related to soil pollution. So, to address the soil pollution, there should separate the legal framework and regulatory body. As per the existing laws, the country's citizens or individuals cannot file lawsuits against any responsible agency or people for polluting soil. Besides, the existing legal systems to monitor the soil quality are very poor in the country. The soil pollution is continuing sharply due to lake of preventive measures, inadequate resources, limited autonomy, and absence of proper supervision. Besides, due to the complicated legal proceedings, these laws cannot be enforced properly. The DoE, the apex body to implement the environmental laws and supervise the environmental issues, is "not functioning" effectively. In the existing laws, the director general of DoE has been given the power to check whether the environment is being polluted and can take legal steps to stop any pollution. But, there are no specific guidelines to appoint a DG, nor is there any legal framework to make him accountable.

Recommendations and Conclusion

Bangladesh government has already modified several laws to pull the reins of environmental

pollution in the country. This country also established an environment court to take legal action against culprits. Proper implementation of the laws can help reduce soil pollution. Beyond that, by the promotion of renewable resources like solar and biomass, soil pollution can be minimized. The use of renewable sources is not at a satisfactory level in the country still in comparison with expectation, demand and global standard. As per the accepted level of global standard in Germany, 20% of electricity and 10% of primary energy demands should be covered with renewables in Germany by 2020. According to a study of German Ökoinstitut, about 10% of the electricity, heating, and fuel for cars would be produced in Germany from biomass alone by 2020.

To reach such a destination, Bangladesh needs also more support from the public and private partnership. However, we see some positive initiatives in this regard as well. Department of Environment and a local NGO Waste Concern jointly have taken an initiative involving the community in waste recycling. This community approach is an example of successfully waste collection despite a problem has arisen over the incapacity of City Corporation to collect this waste and dumping in the landfills. According to a World Bank report, Bangladesh is the most vulnerable country on this issue. Combating environmental crimes in the soil can be a corollary goal of the country as if the proper waste management policies were being implemented. Any kind of human activities needs to be addressed, as such activities led to soil pollution. As environmental crimes leading to soil pollution, human activities need to be sorted out from different sources. On the other hand, such devastating activities will drive the entire ecosystem towards biodiversity loss, worsening of environmental sustainability and distraction of natural resources, all of which result in climate change. So educating people about the importance of the environment in the country is very important if they are not aware of it. Besides, soil erosion prevention can help to contain the soil pollution. And thus it is essential for people and organizations to understand the importance of soil, and to help avoid soil pollution, and to stop the destruction of plant and animal life.

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