**UNIVERSITY OF BARISHAL**

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**A Project proposal**

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SOIL POLLUTION–A CONSEQUENCE OF ENVIRONMENTAL

MISDEEDS: BANGLADESH CONTEXT

**Abstract**

Soil pollution is an escalating environmental crisis with profound implications for public health, agriculture, and biodiversity. In Bangladesh, a densely populated and rapidly developing nation, soil pollution has become a significant consequence of industrialization, urbanization, and unsustainable agricultural practices. The proliferation of hazardous chemicals, untreated industrial waste, plastic disposal, and excessive use of synthetic fertilizers and pesticides has led to the degradation of soil quality, adversely affecting agricultural productivity and the health of ecosystems. This paper examines the causes, consequences, and current state of soil pollution in Bangladesh, emphasizing the role of environmental mismanagement, industrial growth, and agricultural policies in exacerbating the issue. It also explores the economic, social, and environmental impacts on local communities, particularly in rural areas dependent on agriculture. In response, the paper discusses potential solutions, such as sustainable farming practices, stricter environmental regulations, public awareness campaigns, and technological innovations for soil remediation. Addressing soil pollution is imperative for ensuring a healthy environment, safeguarding food security, and promoting long-term sustainable development in Bangladesh.

**Introduction**

Soil pollution refers to the degradation of soil quality due to the introduction of harmful chemicals or other pollutants, which can result from human activities such as industrial waste disposal, improper agricultural practices, and urbanization. In Bangladesh, the growing population and industrial activities have led to widespread soil contamination, which poses serious risks to the environment and the health of its people.

**Causes of Soil Pollution in Bangladesh**

1. **Industrial Waste and Chemicals**
   * Bangladesh has witnessed rapid industrial growth, especially in sectors like textiles, tanneries, and agriculture. Many industries discharge untreated waste and chemicals like heavy metals, toxic dyes, and chemicals directly into the soil.
   * For example, textile dyeing industries and leather tanneries use hazardous chemicals that often end up in surrounding soil, contaminating it.
2. **Pesticides and Fertilizers in Agriculture**
   * In an attempt to increase agricultural productivity, farmers in Bangladesh often use excessive amounts of chemical fertilizers and pesticides. While this increases crop yields, it leads to the accumulation of harmful chemicals in the soil, which can degrade its fertility and pollute nearby water sources.
3. **Improper Waste Disposal**
   * Improper disposal of solid waste, including plastics, electronic waste, and household garbage, contaminates the soil. In urban areas like Dhaka, waste management systems are often inefficient, leading to waste being dumped in open spaces or landfills, which leaches harmful substances into the ground.
4. **Oil Spills and Contaminated Water**
   * The discharge of untreated oil and industrial effluents into water bodies has been a significant concern in Bangladesh. These contaminants eventually reach the soil, altering its composition and fertility.
5. **Construction and Urbanization**
   * Unplanned urbanization leads to large-scale construction, which often involves the use of hazardous materials and improper disposal of construction waste. This contributes to the degradation of soil in urban and peri-urban areas.

**Table summarizing some soil pollution in Bangladesh and their erects**

|  |  |  |  |
| --- | --- | --- | --- |
| Category | Source | Pollutants Involved | Effect on Soil and Environment |
| Industrial Pollution | Industrial waste discharge | Heavy metals (lead, cadmium, mercury) chemicals | Contamination soil with toxic metals, affecting soil fertility and plant health. |
| Agricultural pollution | Use of pesticides chemical fertilizers | Pesticides (DDT, Organochlorines) chemical fertilizer (NPK) | Soil toxicity, loss of biodiversity, and disruption of soil microbes |
| Urbanization and construction | Construction debris, waste from urban areas | Plastic waste, metals, chemicals | Decreases soil quality and permeability, soil degradation. |
| Mining Activities | Coal mining stone | Heavy metals acidic runoff | Acid mine drainage leads to |

**Prevention and Remediation**

1. **Sustainable Farming Practices**: waste disposal to reduce using organic fertilizers, crop rotation, and integrated pest management can reduce the reliance on chemical inputs, minimizing soil contamination.
2. **Proper Waste Disposal**: Encouraging recycling and safe disposal of hazardous waste helps limit the introduction of harmful substances into the soil.
3. **Soil Remediation**: Techniques such as bioremediation (using microorganisms to degrade pollutants), phytoremediation (using plants to remove toxins), and soil washing can help clean polluted soils.
4. **Regulations**: Governments and organizations can implement stricter regulations on industrial waste, pesticide use, and soil
5. **Public Awareness**: Educating communities about the impact of soil pollution and promoting environmental protection can lead to better practices and less pollution contamination.

Soil pollution is a growing concern, especially with the increase in industrial activity, urbanization, and intensive agricultural practices. Addressing this issue requires a collective effort from governments, industries, and individuals to protect soil health for future generations.

Workflow for developing Digital Soil Mapping (DSM) in show below:

Generation of spatial information

Covariate Selection

Conversion (through value of class)

**Consequences of Soil Pollution in Bangladesh**

1. **Impact on Agriculture**
   * Soil pollution in Bangladesh severely affects agricultural productivity. Contaminants like heavy metals and pesticides accumulate in the soil, harming soil organisms, reducing fertility, and inhibiting plant growth.
   * Crops grown on polluted soils may absorb toxic chemicals, which can accumulate in the food chain, posing health risks to humans and animals.
2. **Public Health Risks**
   * Soil contamination directly impacts human health. Polluted soil can release harmful chemicals into the air and water, increasing the risk of respiratory diseases, skin conditions, and gastrointestinal problems.
   * Toxic chemicals from the soil, such as lead and arsenic, can enter the human body through the consumption of contaminated crops or drinking water.
3. **Loss of Biodiversity**
   * The soil serves as a habitat for many species of microorganisms, insects, and plants. Pollution disrupts these ecosystems, leading to a loss of biodiversity. This can affect the broader ecosystem, including pollination and the food chain.
4. **Contamination of Water Sources**
   * The toxic substances in polluted soils can leach into groundwater, contaminating drinking water sources. In Bangladesh, where many rural communities rely on groundwater, this poses a significant health risk.
5. **Economic Losses**
   * The agricultural sector, which is vital to Bangladesh's economy, is severely affected by soil pollution. Decreased agricultural productivity leads to economic losses for farmers and the country as a whole.

* The government of Bangladesh needs to enforce stronger regulations on industrial waste management, particularly in sectors like textiles and leather production. Industries should be held accountable for discharging hazardous waste into the environment
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**Solutions and Mitigation Measures**

1. **Adoption of Sustainable Agricultural Practices**
   * Promoting organic farming and reducing the use of chemical pesticides and fertilizers can significantly reduce soil contamination. The use of eco-friendly alternatives, like bio-pesticides and organic fertilizers, should be encouraged.
2. **Improved Waste Management**
   * Effective waste disposal systems and the recycling of industrial and household waste can prevent soil contamination. Initiatives to raise public awareness about proper waste disposal can also help reduce pollution.
3. **Implementation of Strict Environmental Regulations**

The government of Bangladesh needs to enforce stronger regulations on industrial waste management, particularly in sectors like textiles and leather production. Industries should be held accountable for discharging hazardous waste into the environment.

1. **Soil Remediation Technologies**
   * The use of soil remediation techniques such as bioremediation (using microorganisms to break down pollutants) or phytoremediation (using plants to absorb pollutants) can help clean contaminated soil.
2. **Public Awareness and Education**
   * Raising public awareness about the causes and consequences of soil pollution can help communities take preventive actions. Educational campaigns targeting farmers, industries, and the general public can promote environmentally responsible behavior.
3. **Government Initiatives and Policies**
   * The government must take a leading role in addressing soil pollution by enacting stronger environmental protection laws and encouraging sustainable practices. National policies should focus on sustainable urbanization, industrial waste management, and agricultural practices that protect the soil.

**Conclusion**

Soil pollution in Bangladesh is a serious environmental issue that threatens agriculture, human health, and the overall well-being of ecosystems. Addressing this challenge requires a multi-faceted approach, including better waste management, more sustainable farming practices, and stricter industrial regulations. The active involvement of the government, industries, and citizens will be essential in reversing the trend of soil degradation and ensuring a healthier environment for future generations.

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