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Research Article

Why Environmental Pollution Remains Unresolved Despite Efforts to Mitigate It?

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Abstract. Environmental pollution remains a persistent global challenge despite extensive efforts to mitigate its effects. This ongoing issue is driven by multiple factors, including industrialization, technological limitations, political barriers, and a lack of public awareness. Industrial activities continue to be the primary source of pollution, significantly degrading air, water, and soil quality (Jones, 2019). While technological advancements have introduced pollution control mechanisms, high costs and inefficiencies limit their widespread adoption, particularly in developing nations (International Energy Agency, 2021). Political and regulatory challenges, such as weak enforcement and regulatory capture by powerful industrial lobbies, further hinder effective pollution management (Smith, 2022; Miller & Davis, 2020). Additionally, the global nature of pollution necessitates international cooperation, but geopolitical interests and economic priorities often undermine international agreements like the Paris Agreement and the Kyoto Protocol (United Nations, 2015; UNEP, 2018). Compounding these issues is a general lack of public awareness and engagement, which weakens the impact of grassroots movements and the support for environmental policies (McKenzie-Mohr, 2011). As pollution levels rise, increasing public consciousness through direct experiences and media coverage becomes essential to drive collective action (Haines et al., 2006). This study concludes

that a holistic approach, encompassing industrial reform, technological innovation, strong political will, and enhanced public awareness, is crucial for effectively addressing and mitigating the global threat of environmental pollution.

Keywords: Industrial Pollution, Environmental Degradation, Technological Limitations, Political Challenges, Public Awareness

INTRODUCTION

Environmental pollution is a critical global issue that significantly impacts ecosystems, human health, and the climate. Despite decades of awareness and efforts to combat the problem, pollution levels continue to escalate in many regions. According to the World Health Organization (WHO), air pollution alone is responsible for approximately 7 million premature deaths annually, highlighting the severity and persistence of this issue (WHO, 2021). This alarming statistic underscores the pressing need to understand why environmental pollution remains unresolved despite numerous mitigation initiatives. Environmental pollution is a global issue for both developed and developing husbandry. These manmade conditioning impact all the factors of the terrain. The external, artificial waste and agrarian practices, decreasingly domestic, which beget wastewater, are primary arising adulterants currently. A large number of physical, chemical or natural substances comprising chemicals, fungicides, chemical diseases, heavy essence, non-degradable, bioaccumulation, nutrients, natural agents and poisonous substances beget water and soil pollution. The rising position of these chemicals and composites have only lately been linked as implicit pitfalls to the terrain and aren't yet extensively regulated by public or transnational laws. It's a grueling issue for mortal society to break these issues (Yasar Nishat, 2022). People are finding about its solution everyday but they are badly failing to prevent its remedies. Many journals, newspapers, tv show and other social media warn the people but constantly pollution is going to break its past.

QUESTIONS

1. Is it possible to prevent environment pollution for humans?
2. Why people are becoming fail to prevent it?
3. As using the regular products of the people are responsible for the environment pollution mostly. Then, what could work as the alternative way?

3. Historical Context:

Environment is being polluted from many years ago due to the human responsibility. Emissions of greenhouse gases of human origin are the main cause of climate change. Their effects on global warming are devastating, and it is becoming increasingly urgent that these emissions are reduced to stop humans from exerting so much pressure on the planet. The situation is so critical that the International Energy Agency (IEA) has forecast an increase in emissions of 130% by 2050 if we continue unabated (IEA, 2019).

The most polluting countries seem to be aware they must reduce their emissions, but, despite agreements such as the Kyoto Protocol, these carbon dioxide emissions continue to rise (United Nations, 1998). To a greater or lesser extent, almost all the world's countries are responsible for the high level of global pollution, but there are five that stand out from the rest:

China(30%)

The world's most populated country has an enormous export market, which has seen its industry grow to become a serious danger to the planet. In just five provinces, which host most of these industries, more carbon dioxide is emitted than in any other country in the world. As a consequence, Beijing has experienced constant red alerts for environmental pollution in recent years (World Bank, 2020)

UnitedStates(15%)

The world's biggest industrial and commercial power has led some important initiatives to combat climate change. However, in practice, the majority have been shown to be insufficient. The pollution levels are not limited to big cities; many rural areas are also beginning to notice the consequences (EPA, 2021).

India(7%)

Fourteen out of the world's 15 most contaminated cities are in India, according to the World Health Organization (WHO, 2021). Despite having a law protecting air quality since 1981, the burning of fossil fuels has grown significantly, placing India in third place in the ranking of the most polluting countries in the world.

Russia(5%)

The largest country in the world geographically appears in this ranking due to its high dependence on products such as oil, coal, gas, and fossil fuels. In the past few decades, it has experienced several environmental emergencies and continues to have high levels of deforestation and animal hunting (Greenpeace, 2020).

Japan(4%)

Finally, Japan, the other great Asian power after China, completes the list. It is the biggest consumer of fossil fuels in the world and the fifth-largest emitter of greenhouse gases. This situation is attributed to its high level of urban development and industry that appears to care little for nature (METI, 2021).

Evidence from Greece shows that the problems of polluted air outdoors were being documented at least 2400 years ago. The book *Airs, Waters, and Places* attributed to Hippocrates (ca. 400 BC) suggested all sorts of illness as being related to the quality of air. The worst, it seems, was in cities facing damp westerly winds, where the inhabitants "are likely to have deep, hoarse voices, because of the atmosphere, since it is usually impure and unhealthy in such places" (Hippocrates, ca. 400 BC, as cited in Jackson, 2019, p. 83). Writers a little later from Imperial Rome understood the probable health impacts of smoke, with Seneca (ca. AD 63–65) referring to the problem and Frontinus (ca. AD 96) proudly declaring how his contribution to aqueducts and fountains helped make the air purer: "the causes of the unwholesome atmosphere, which gave the air of the City so bad a name with the ancients, are now removed" (Frontinus, ca. AD 96, as cited in Smith, 2020, p. 417). As Seneca recorded of a health break from Rome:

"As soon as I escaped from the oppressive atmosphere of the city, and from that awful odour of reeking kitchens which, when in use, pour forth a ruinous mess of steam and soot, I perceived at once that my health was mending... So I am my old self again, feeling now no wavering languor in my system, and no sluggishness in my brain" (Seneca, ca. AD 63–65, as cited in Brown, 2021, p. 193).

Industry, first world war, second world war, post-WWII Economic Boom (Mid-20th Century) and the others war are responsible for the environment pollution. The 1980s and 1990s were marked by increased global awareness of environmental issues, including climate change, ozone depletion, and acid rain. The Montreal Protocol of 1987 demonstrated the potential for international cooperation in addressing specific environmental challenges, particularly the depletion of the ozone layer (Andersen & Sarma, 2002).

4.Industrial and Economic Factors:

After the renaissance of industrial revolution, industries are the biggest contributors to environmental pollution. With the advancement of technology and manufacturing, industries are rapidly developing, becoming major contributors to environmental degradation. This degradation, in turn, exacerbates extreme weather events, transforming them into natural disasters (Smith et al., 2020). Industrial pollution refers to any form of pollution originating from industrial practices, which significantly impacts the environment, leading to various types of pollution, such as air, water, thermal, and noise pollution (Jones, 2019).

Air pollution: Industrial emissions containing harmful gases, such as carbon dioxide (CO_2), sulfur dioxide (SO_2), and carbon monoxide (CO), are major contributors to air pollution (Brown & Green, 2018). Smoke from industrial processes releases these undesirable gases into the atmosphere, degrading air quality (Anderson, 2017).

Water Pollution: The release of untreated industrial wastewater into natural water bodies causes significant water pollution, introducing harmful chemicals and heavy metals into aquatic ecosystems (Williams & Smith, 2016). This is particularly evident in industries such as textiles, chemicals, and oil refining, which discharge large volumes of pollutants into rivers and lakes (Nguyen, 2018).

Soil Pollution and Health: Soil pollution, resulting from the extraction of raw materials, poses chronic health risks to individuals who regularly come into contact with contaminated soil (Walker, 2016). The emitted chemicals mix with soil and contaminate the soil organic matter. As a result of it, soil loss its productivity and excellence.

Thermal Pollution: Thermal pollution occurs when industries discharge heated water or other effluents into natural water bodies without proper cooling. This sudden increase in water temperature disrupts aquatic ecosystems, often leading to the death of aquatic organisms and reducing oxygen levels in the water (Langford, 1990). Industries such as power plants and manufacturing facilities are major contributors to thermal pollution, as they often use water as a cooling agent and then release it back into rivers, lakes, or oceans at elevated temperatures (Krause, 2017). Consequently, decreased the oxygen levels in water bodies (Kaushal, 2010), disruption

of reproductive processes in the aquatic species and alteration of aquatic ecosystems (Coutant, 1970), leading to reduced the biodiversity (Ziegler, 2016).

Noise Pollution: Noise pollution is an unwanted or harmful sound that disrupts the normal acoustic environment. Industrial and construction activities, heavy machi nery, and transportation systems are significant sources of noise pollution (Berglund & Lindvall, 1995). Prolonged exposure to high noise levels can lead to adverse health effects, including hearing loss, stress, increased blood pressure, and sleep disturbances (Babisch, 2005). Hearing impairment (Nelson, 2005), psychological stress and increased risk of cardiovascular diseases (Stansfeld & Matheson, 2003) can be seen due to the noise pollution.

5. Political and Regulatory Challenges:

Resolving environmental pollution is a complex issue that is heavily influenced by political and regulatory factors. One of the most significant challenges is the lack of political will to address environmental issues. Governments may prioritize economic growth over environmental protection, leading to insufficient funding, weak policies, or the outright neglect of environmental concerns. Political leaders may also face pressure from powerful interest groups, such as industries that contribute to pollution, which can hinder the adoption and implementation of stringent environmental regulations (Smith J. 2022). Even when strong environmental laws are in place, enforcement can be weak due to corruption, lack of resources, or inefficiencies within regulatory bodies. This undermines the effectiveness of laws and allows polluters to evade responsibility. In many cases, enforcement agencies are underfunded and understaffed, making it difficult to monitor and penalize non-compliance effectively (Lee, S. 2021). Besides, Corporations often have significant influence over the political process through lobbying, which can lead to the dilution of environmental regulations. Companies may lobby for weaker regulations, argue against climate change policies, or push for subsidies that benefit polluting industries. This corporate influence can result in regulatory capture, where regulatory agencies act in the interest of the industries they are supposed to regulate rather than the public (Miller, C., & Davis, A. 2020). The biggest countries are the main polluter countries in the world like US, China, India, Russia and so on. These are the industrial countries and they are biggest donor in the environmental organizations such as United Nations Environment Programme (UNEP), Greenpeace, International Union for Conservation of Nature (IUCN). They make law according to their advantage. So, the organizations cannot go beyond their decision. It can be called a unilateral system. That's why , the politics and the regulations are the most barriers to resolve the pollution.

Technological Limitations:

Technological advancements play a critical role in addressing environmental pollution. However, various technological limitations hinder the effectiveness of these efforts. These limitations can be broadly categorized into high costs, inefficiencies, inadequate monitoring capabilities, and dependence on fossil fuels.

High Costs and Economic Barriers: One of the most significant challenges in adopting advanced pollution control technologies is their high cost. For instance, technologies like carbon capture and storage (CCS) require substantial initial investment and ongoing operational costs, making them less accessible, particularly in developing countries (International Energy Agency, 2021). The economic feasibility of these technologies is also a concern, as the costs often outweigh the perceived benefits, especially when compared to more traditional methods (United Nations Environment Programme, 2022).

Technological Inefficiencies: Many pollution control technologies are not fully effective in eliminating pollutants. For example, wastewater treatment plants may fail to remove all contaminants, leading to residual pollution in water bodies (Environmental Protection Agency, 2022). Similarly, air filtration systems may not capture all particulate matter, particularly the smallest and most harmful particles (World Health Organization, 2021). Furthermore, some technologies are highly energy-intensive, which can indirectly contribute to environmental pollution by increasing greenhouse gas emissions (Global Water Intelligence, 2023).

Inadequate Monitoring and Detection Technologies: Effective pollution management relies heavily on accurate and real-time data. However, many regions lack the necessary technology for comprehensive monitoring of pollution levels, leading to delayed responses and inadequate interventions (Environmental Protection Agency, 2022). Moreover, the detection of emerging contaminants, such as microplastics and pharmaceutical residues, is still in its early stages, with current technologies often inadequate for their detection and quantification (Science Advances, 2023).

Challenges in Waste Management Technologies: The inefficiency of recycling technologies is another significant limitation. Many recycling processes are not advanced enough to handle complex materials like electronic waste or certain types of plastics, leading to substantial amounts of waste ending up in landfills or being incinerated (Basel Convention, 2022). Additionally, treating hazardous waste, such as radioactive materials, requires sophisticated technologies that are not universally available, posing severe risks to the environment (International Atomic Energy Agency, 2023).

Dependency on Fossil Fuels : The global reliance on fossil fuels for energy production remains a significant barrier to reducing pollution. Although renewable energy technologies are advancing, the transition away from fossil fuels is slow due to the challenges associated with energy storage and grid integration (International Renewable Energy Agency, 2023). The transportation sector also contributes to this issue, as the current infrastructure heavily depends on internal combustion engines. While electric vehicles offer a cleaner alternative, challenges such as battery production and the environmental impact of mining for materials persist (International Energy Agency, 2023).

7.Lack of Public Awareness:

A significant challenge is the lack of awareness and environmental consciousness among the general population. Many people may not fully understand

the importance of environmental protection or the consequences of environmental degradation, which can hinder effective implementation of environmental laws. Lack of public awareness significantly impedes efforts to resolve environmental pollution due to several interrelated factors. These include the underestimation of pollution's impacts, reduced public engagement in sustainable practices, and weak support for environmental policies.

Rising Pollution Levels and Direct Experience :

As pollution levels increase, more people directly experience its adverse effects, such as respiratory issues from air pollution or contaminated water sources. These personal experiences often lead to a greater awareness of environmental problems and a stronger desire for action (Haines, Kovats, Campbell-Lendrum, & Corvalan, 2006). For example, in areas with high smog levels, public awareness campaigns are often more effective because people can directly relate to the problem.

Global Media Coverage and Social Media Influence :

Increased media coverage of environmental disasters, such as oil spills, wildfires, or plastic pollution in oceans, plays a significant role in raising public awareness. Social media platforms amplify this effect by rapidly spreading information and mobilizing communities around environmental issues, leading to greater public consciousness (Schmidt, Ivanova, & Schäfer, 2013). The visibility of pollution events can catalyze awareness and drive collective action.

Scientific Research and Public Education

The growing body of scientific research on environmental pollution has been crucial in raising awareness. Studies that link pollution to health risks or biodiversity loss are often cited in media reports, educational programs, and public policy discussions, making the issue more salient to the public (Díaz et al., 2019). Education initiatives, especially those that simplify complex scientific data for the general audience, further increase awareness and understanding.

Advocacy and Grassroots Movements :

Environmental advocacy groups and grassroots movements have become more prominent as pollution issues escalate. These organizations often use the increasing evidence of environmental degradation to educate and mobilize the public, which in turn raises awareness. They highlight the tangible impacts of pollution, making it a more immediate concern for people (García & Junyent, 2020).

8.What can be the solutions and how can be resolved and protest the environmental pollution? :

Advocates should be more careful:

The people who advocates to protest environmental pollution, they use AC, fuel oil car, refrigerator, and others materials which are harmful for the environment. Even, people are going in outer space by rocket which also pollutes air. The modern invented technologies are beneficial for the modern generation but it will also think in head that modern inventions have to be used sparingly so that they are not harmful to the environment.

Plant tree in the balcony and on the roof:

Alternative way have to be found to keep the house cool.

For example: people can plant tree in the balcony of the house like Aloe Vera, Areca Palm, Golden Pothos or White-Green Michel's Money Plant, Snake Plant or Fonimonsa, Fern etc. also ivy, fast growing vines and decorative houseplants can be used on walls or windows. In addition to enhancing beauty, it will also act as heat and sun protection.

Besides, wear white or light-colored clothing that reflects heat rather than absorbing it. White color helps keep the room cool naturally by blocking ultraviolet rays. Although there are many types of curtains in the market, if you want to reduce the heat, you can choose thick fabrics and dark colors such as black, purple, blue, khaki. Because they have high heat absorption capacity, heat radiation capacity is low.

A common practice among the ancient Egyptians was to create cooling pools. They used to place wet mats or mats in the window-doors or sun-entry places. The heat of the sun did not get a chance to dry the wet mat or the water of the wet chaat and increase the temperature inside the room.

Policy Interventions and Regulations:

Governments play a critical role in addressing environmental pollution through the enactment and enforcement of policies and regulations. Effective policies might include stricter emissions standards, pollution taxes, and the promotion of renewable energy sources. For instance, the implementation of the Clean Air Act in the United States has significantly reduced air pollution levels by regulating industrial emissions (Chowdhury et al., 2018).

Policy Example:

Carbon Pricing: Carbon pricing, including carbon taxes and cap-and-trade systems, has been shown to be effective in reducing greenhouse gas emissions by making polluters pay for the carbon they emit (CPLC, 2017).

Technological Innovations:

Technological advancements are crucial for mitigating pollution. Innovations such as cleaner production techniques, pollution control devices, and waste management technologies can significantly reduce environmental pollution. For example, the development of catalytic converters in automobiles has drastically reduced the emission of harmful gases (Hao et al., 2018).

Technology Example:

Green Technology: The adoption of green technologies, such as renewable energy systems (solar, wind), electric vehicles, and energy-efficient appliances, plays a key role in reducing pollution at its source (IRENA, 2019).

Public Awareness and Education:

Raising public awareness about the causes and consequences of pollution is essential for fostering environmentally responsible behaviors. Education campaigns can empower individuals and communities to take action by reducing waste, recycling, and advocating for sustainable practices (McKenzie-Mohr, 2011).

Awareness Example:

Behavior Change Campaigns: Community-based social marketing (CBSM) is a proven approach that uses social science techniques to change public behaviors and reduce pollution through local engagement and education (McKenzie-Mohr, 2011).

Community Engagement and Grassroots Movements:

Grassroots movements and community engagement are powerful tools in the fight against environmental pollution. Local communities often bear the brunt of pollution, and their involvement in advocacy and decision-making processes can lead to more effective and sustainable outcomes. Grassroots movements have been instrumental in protesting against environmentally harmful practices and in pushing for environmental justice (Bullard, 2000).

Community Example:

Environmental Justice Movements: Environmental justice movements advocate for the rights of marginalized communities disproportionately affected by pollution. These movements often succeed in pressuring governments and corporations to adopt cleaner practices (Schlosberg, 2013).

International Cooperation:

Environmental pollution is a global issue that requires international cooperation. Collaborative efforts, such as the Paris Agreement, aim to unite countries in the fight against climate change and pollution by setting collective goals for emission reductions (United Nations, 2015).

International Example:

Global Agreements: International agreements and treaties can effectively coordinate global efforts to reduce pollution and mitigate environmental damage. The Montreal Protocol, for example, successfully phased out the use of ozone-depleting substances, demonstrating the power of coordinated international action (UNEP, 2018).

Moreover, organic fertilizers should be used instead of pesticides on the land. Avoid plastic. Dirt, fuel and waste materials shall not be dumped anywhere.

It should be remembered, "damage to the environment means damage to ourselves. A healthy environment means we are healthy."

CONCLUSION

Environmental pollution persists as a major global challenge despite significant efforts to mitigate its effects due to a complex interplay of factors, including industrial activities, technological limitations, political challenges, and insufficient public awareness. Industrialization, driven by economic growth and technological advancement, continues to be a primary source of pollution, contributing to the degradation of air, water, and soil quality (Jones, 2019). The reliance on fossil fuels, coupled with the inefficiencies of existing pollution control technologies, exacerbates the problem, as many current solutions are either too costly or not entirely effective in eliminating pollutants (International Energy Agency, 2021).

Political and regulatory challenges further complicate the resolution of environmental pollution. The lack of political will, often influenced by powerful industrial lobbies, results in weak enforcement of environmental regulations and insufficient funding for pollution control initiatives (Smith, 2022). Even when robust environmental laws are in place, their implementation is frequently undermined by corruption, limited resources, and regulatory capture (Miller & Davis, 2020).

Additionally, the global nature of pollution necessitates international cooperation, yet geopolitical interests and economic priorities often hinder the effectiveness of international agreements like the Paris Agreement and the Kyoto Protocol (United Nations, 2015; UNEP, 2018).

A critical factor contributing to the ongoing environmental crisis is the lack of public awareness and engagement. Without a well-informed and motivated public, efforts to reduce pollution through behavioral change, grassroots movements, and support for environmental policies are significantly weakened (McKenzie-Mohr, 2011). As pollution levels rise, direct experiences with its adverse effects and increased media coverage are beginning to raise awareness, but these efforts must be amplified to achieve widespread environmental consciousness and action (Haines et al., 2006). In conclusion, resolving environmental pollution requires a holistic approach that addresses industrial practices, technological advancements, political will, and public awareness. Only through coordinated global efforts, supported by effective policies, innovative technologies, and an informed public, can the persistent threat of environmental pollution be effectively mitigated.

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