Journal of Advances and Scholarly Researches in Allied Education
Vol. 17, Issue No. 2, October-2020, ISSN 2230-7540

Air Pollution and Global Warming Issue

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Abstract - Polluted air is a combination of particles and gases that can accumulate to unhealthy levels inside and out. Its effects may include, but are not limited to, higher temperatures and an elevated risk of disease. To name only a few examples of common contaminants: soot, smoke, mildew, pollen, methane, and carbon dioxide. Air pollution has been linked to cellular oxidative stress and inflammation, which may provide the foundation for chronic diseases and cancer in humans. When these fuels are used, they release greenhouse gases including carbon dioxide, methane, and nitrous oxide, all of which add to the problem of climate change. The loss of forest cover also has a role in the global warming. The Earth's environment is under continual danger due to global warming. Most individuals do not know much about global warming and therefore do not think it will be a serious issue in the near future. Unfortunately, the effects of global warming are already being felt, although most people are unaware of this. Absolutely, and it will throw natural processes out of whack. The potentially disastrous effects of global warming need the development of effective countermeasures.

Keywords - Air pollution, Temperatures, Greenhouse Gases, Global Warming, Environment.

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1. INTRODUCTION

Toxic, climate-altering, or materially destructive chemicals can be said to pollute the air when they are present there. Air pollution comes in the form of gases (including ammonia, carbon monoxide, sulphur dioxide, nitrous oxides, methane, and chlorofluorocarbons), particles (organic and inorganic), and living molecules. Humans aren't the only ones who may become sick from breathing polluted air; animals, crops, and the ecosystem itself could all be negatively impacted, and air pollution could even be fatal. Air pollution may be created by either human actions or natural occurrences. Pulmonary infections, cardiovascular disease, chronic obstructive pulmonary disease, stroke, and lung cancer are only some of the pollution-related illnesses that are exacerbated by polluted air. [1]

Extremely disturbing is the planet's persistent warming. A major contributor to this is the warming of the planet. The arrival of solar radiation to Earth is the first step in the onset of global warming. About 30% of sunlight is reflected back into space by atmospheric particles, clouds, and reflecting ground and ocean surfaces, while the remaining 70% is absorbed by the water, air, and land. The result is an increase in temperature that can support life on Earth's surface and in its atmosphere. When the planet becomes too hot, it cools off because some of the solar energy is lost to space in the form of infrared and thermal radiation. However, atmospheric gases like carbon dioxide, water vapour, ozone, and methane re-absorb portion of the outgoing radiation, sending it back to Earth's surface. Because of their ability to trap heat, these gases are frequently referred to as greenhouse gases. This re-absorption process is beneficial, as the absence of greenhouse gases would cause the Earth's average surface temperature to plummet. [2]

1.1 Public Health Importance of Air

- Environmental toxins in the air are a very intricate chemical and physical system. One way to conceptualise it is as a collection of dissolved or suspended components that interact with one another and work in concert to create the observed results.
- Changes in the season, industrial output, traffic patterns, and wind direction are only few of the variables that affect the makeup of air pollution. Air pollution tends to cycle in its composition rather than being the same from day to day or even week to week on average. While seasonal fluctuations explain most of the annual ups and downs, year-to-year fluctuations account for the vast majority of the variation.
- Transmission of diseases through the air is one of the most concerning issues in public health. This means that overpopulation and poor air circulation are

making it easier for contaminants to spread.

- Households in Ethiopia's rural areas are particularly vulnerable to indoor air pollution because they often have a larger number of occupants, fewer windows and doors, and spend a larger amount of their time indoors.[3]

2. TOXIC EFFECTS OF AIR POLLUTANTS

Human activity that releases chemical compounds into the atmosphere, or the chemicals produced when chemical emissions interact, has been linked to negative health impacts. The type of the molecule, the air concentration, and the length of exposure time are crucial factors in producing these effects, as explained in this study. It is possible to divide the negative health consequences of air pollution into two categories: those induced by long-term exposure and those caused by short-term exposure. [4]

i. Health effects due to acute exposure to air pollutants

Instances of high levels of pollutants have been linked to increases in various respiratory and cardiac ailments and mortality, and reports of toxic consequences owing to acute exposure to air pollutants have been made nearly since the beginning of the industrial revolution. These occurrences are not uncommon, especially in highly industrialised and/or populated regions, and have been documented from all around the world.

ii. Health effects due to chronic exposure to air pollutants

Pollution incidents in a variety of places throughout the world have shown what happens when people breathe in toxic levels of air pollution. However, these occurrences are few, and in the present, prolonged exposure to low amounts of contaminants is an everyday occurrence. Most current research has centred on determining the long-term consequences of exposure to a substance. [5]

2.1 Indoor Air Quality

People spend a disproportionate amount of time indoors, where air pollution tends to be more concentrated due to poor ventilation. In some areas, radon gas, a known carcinogen, is released from the ground and accumulates within homes. Formaldehyde (H2CO) gas is released from carpets and plywood, two common construction materials. Drying paint and solvents release VOCs into the air. Deteriorated lead paint can be breathed in as a dust. The usage of incense, candles, and other fragrant products contributes to air pollution on purpose. Even when properly ventilated, the smoke from indoor wood stoves and fireplaces can contribute significantly to outdoor pollution levels. Without adequate ventilation, the use of pesticides and other chemical sprays indoors can lead to deadly levels of indoor pollution. Carbon monoxide poisoning and deaths are generally the result of improper ventilation, such as in a tent, or the usage of charcoal inside. The poisoning from carbon monoxide can be chronic even if the pilot light is not adjusted properly. Sewer gas and hydrogen sulphide can be dangerous, hence traps are installed in all residential plumbing systems. Fabrics continue to off-gas tetrachloroethylene and other dry cleaning solvents for days after being cleaned.[6]

2.2Causes of Air Pollution

Pollutants released by the combustion of fossil fuels One of the main causes of air pollution is sulphur dioxide, which is released when fossil fuels like coal, petroleum, and other combustibles in factories are burned. However, the over usage of these products is harming our ecosystem since they release harmful chemicals into the air. [7]

i. Burning of Fossil Fuels

Large quantities of sulphur dioxide are released when fossil fuels are burned. When fossil fuels are burned improperly, carbon monoxide is discharged into the atmosphere.

ii. Automobiles

Polluting the atmosphere with exhaust emissions from automobiles, trucks, buses, and other motorised vehicles. In addition to contributing significantly to global warming, these activities are also key drivers of human illness. [8]

iii. Agricultural Activities

One of the most dangerous chemicals released as a result of farming is ammonia. Environmental contamination is caused by the insecticides, pesticides, and fertilisers that are released into the air.

iv. Factories and Industries

The majority of CO2, organic molecules, hydrocarbons, and chemicals in the environment come from manufacturing and industrial facilities. Disturbing the air quality, these are discharged into the atmosphere. [9]

2.3 Air Pollution Control

It is recommended that people take the following actions to reduce air pollution: [10]

i. Avoid Using Vehicles

People should avoid using vehicles for shorter distances. Rather they should prefer public modes of transport to travel from one place to another.

This not only prevents pollution but also conserves energy.

ii. Energy Conservation

In order to produce electricity, a substantial quantity of fossil fuels must be burned. As a result, when not in use, please turn off all electronics. This means that even on a personal basis, you can help rescue the planet. CFLs and other energy-efficient light bulbs can also be used to reduce pollution levels.

iii. Use of Energy efficient appliances

Incomplete combustion of fuel is a major contributor to air pollution, thus it is imperative that we promote the use of energy-efficient appliances at all levels of society, from the home to the factory.

iv. Shifting industries

Manufacturing facilities, factories, and industries might be relocated to less-populated rural areas as another method of mitigating air pollution's negative health consequences.[11]

3. GREENHOUSE EFFECT

Earth's surface maintains relatively mild, consistent temperatures, but those of other planets in our solar system range from scorching hot to icy cold. Earth's atmosphere, the thin layer of gases that covers and protects the planet, is responsible for its comfortable temperatures. Yet nearly all climate scientists and researchers (97% or more) believe that human activity over the last two centuries has significantly altered the Earth's atmosphere, leading to an increase in average world temperatures. Learning about the greenhouse effect is the first step in comprehending global warming. Normally, as seen in Fig.1, the natural greenhouse effect retains enough heat to keep our planet from freezing, while the human-enhanced greenhouse effect causes global warming. It's because human activities like fossil fuel burning boost atmospheric concentrations of greenhouse gases like carbon dioxide, methane, and nitrous oxide. [12]

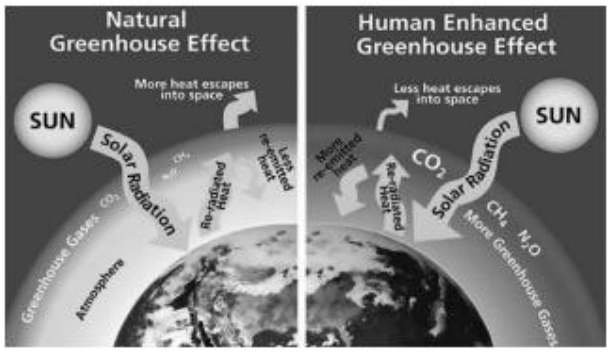

Figure 1: Types of greenhouse effects

4. CAUSES OF GLOBAL WARMING

Greenhouse gases are a key contributor to climate change. Compounds with chlorine and bromine are also among them. Increases in these gases alter the atmosphere's radiativebalance. Greenhouse gases absorb part of Earth's emitted energy and re-radiate it back towards the surface, warming both the surface and the lower atmosphere. From 1850 through the end of the 20th century, the net warming was comparable to about 2.5 W/m2, with carbon dioxide contributing roughly 60%, methane 25%, and nitrous oxides and halocarbons giving the balance. Joe Farman, of the British Antarctic Survey, documented the decline in ozone levels over Antarctica in the early 1980s in an essay he published in 1985. The reaction was dramatic: massive international scientific initiatives were launched to establish that chlorofluorocarbons (CFCs; found in aerosol propellants in industrial cleaning fluids and in refrigeration gadgets) were to blame for the situation. Just as crucial was the swift worldwide effort taken to reduce CFC emissions. The ozone layer's depletion is the second most important contributor to global warming. [13]

5. GLOBAL WARMING: THE EFFECTS

One of the greatest challenges climate scientists confront is attempting to foresee the repercussions of global warming. This is because the occurrence of such phenomena as precipitation, snowfall, hail, and sea level rise depends on a complex interplay of many different elements. In addition, the magnitude of future greenhouse gas emissions is largely driven by technical developments and political actions, making accurate projections difficult. Some of the numerous harmful repercussions of global warming are discussed here. For starters, when excess water vapour in the sky condenses back into precipitation, it can cause flooding in different parts of the world. When the temperature outside increases, the amount of water lost to the atmosphere through land and marine evaporation increases. Drought results in areas when the enhanced evaporation process is not balanced by an equal increase in precipitation. Some parts of the world, especially those with already high temperatures, may see crop failure and hunger as a result of this. The additional water vapour in the sky will eventually condense into rain, leading to flooding. Water shortages and droughts might affect communities that rely on runoff from snow-capped mountains. [14]

5.1 Greenhouse Gases: A Hazard

Many greenhouse gases are released into the atmosphere, and this is primarily due to human activities. Carbon dioxide is at the top of the list and with good reason. The primary driver of this

gas's production is the excessive combustion of fossil fuels like coal and oil. Deforestation, or the cutting down of forests for agricultural or development purposes, is another major contributor to the greenhouse gas problem. When calcium carbonate is heated, lime and carbon dioxide are produced; these gases are then released into the atmosphere as a byproduct of the cement manufacturing process. Methane, or natural gas, is the second polluting gas. It is a byproduct of agricultural processes such cattle digestion, paddy rice growing, and manure application. Another source of methane is the inefficient disposal of garbage. Fertilizers are the major source of nitrous oxides emissions. Moreover, many commercial and industrial refrigeration systems produce fluorinated gases like chlorofluorocarbons (CFCs). Greenhouse gases' geographic spread is depicted pictorially in Fig. 2. There is no doubt that these gases are contributing to the devastation caused by global warming. They are steadily raising the planet's average temperature. [15]

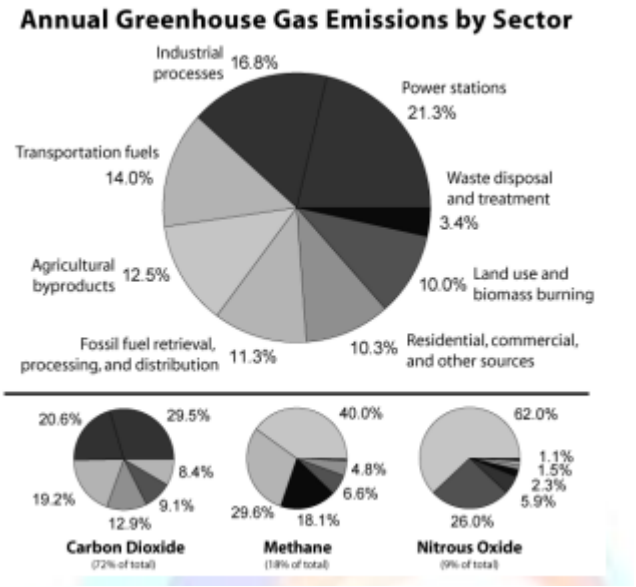

Figure 2: Distribution of greenhouse gases

6. CONCLUSION

The information presented here has just touched the surface of a vast and intricate field of inquiry. Combating global warming is a crucial priority. Not only are humans suffering, but so are animals and plants. When the polar ice caps melt, it will cause widespread flooding that will have devastating effects. Rising seas will have a devastating effect on the agricultural and fishing economies. In the atmosphere, solid particles and gases work together to create air pollution. Airborne particles can include anything from vehicle exhaust to industrial chemicals to dust, pollen, and mould spores. Ozone pollution is a major problem in cities because of the gas ozone. Smog refers to ozone contamination in the air. Some pollutants in the air might be harmful. Inhaling them might potentially increase the risk of illness. Those with preexisting respiratory conditions, the elderly, and children are particularly at risk from exposure to air pollution.

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