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A Review on Various Impacts of Air Pollution

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ABSTRACT
Air pollution is one of the major concern in all around the world as it affects environmental health, human being health, ecosystem, food industry, growth and development, economy etc. Here, author sheds the light on various impacts of air pollution that results in poor health condition of human beings as well as of environment. Author started with the definition of air pollution, air pollutants their main source and discussed every possible impact of it. This study mainly based on the primary and secondary data such as books, newspapers magazines and obviously research articles.

Keywords – *Air pollution, Air pollutants, Environmental health, Ecosystem etc.*

I. DEFINITION

Air pollution is the contamination of air due to the presence of substances in the atmosphere that are harmful to the health of humans and other living beings, or cause damage to the climate or to materials. There are many different types of air pollutants, such as gases (including ammonia, carbon monoxide, sulfur dioxide, nitrous oxides, methane, carbon dioxide and chlorofluorocarbons), particulates (both organic and inorganic), and biological molecules. Air pollution can cause diseases, allergies, and even death to humans; it can also cause harm to other living organisms such as animals and food crops, and may damage the natural environment (for example, climate change, ozone depletion or habitat degradation) or built environment (for example, acid rain). Both human activity and natural processes can generate air pollution.

SOURCES OF EXPOSURE AIR POLLUTANTS

It is known that the majority of environmental pollutants are emitted through large-scale human activities such as the use of industrial machinery, power-producing stations, combustion engines, and cars. Because these activities are performed at such a large scale, they are by far the major contributors to air pollution, with cars estimated to be responsible for approximately 80% of today's pollution . Some other human activities are also influencing our environment to a lesser extent, such as field cultivation techniques, gas stations, fuel tanks heaters, and cleaning procedures , as well as several natural sources, such as volcanic and soil eruptions and forest fires.

CLASSIFICATION OF AIR POLLUTANTS

There are six major air pollutants, namely particle pollution, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Air pollution can have a disastrous effect on all components of the environment, including groundwater, soil, and air.

The classification of air pollutants is based mainly on the sources producing pollution. Therefore, it is worth mentioning the four main sources, following the classification system: Major sources, Area sources, Mobile sources, and Natural sources. Major sources include the emission of pollutants from power stations, refineries, and petrochemicals, the chemical and fertilizer industries, metallurgical and other industrial plants, and, finally, municipal incineration.

Indoor area sources include domestic cleaning activities, dry cleaners, printing shops, and petrol stations. Mobile sources include automobiles, cars, railways, airways, and other types of vehicles. Finally, natural sources include, as stated previously, physical disasters such as forest fire, volcanic erosion, dust storms, and agricultural burning. However, many classification systems have been proposed.

Another type of classification is a grouping according to the recipient of the pollution, as follows:

Air pollution is determined as the presence of pollutants in the air in large quantities for long periods. Air pollutants are dispersed particles, hydrocarbons, CO, CO2, NO, NO2, SO3, etc. Water pollution is organic and inorganic charge and biological charge at high levels that affect the water quality .

Air pollution can influence the quality of soil and water bodies by polluting precipitation, falling into water and soil environments . Soil pollution occurs through the release of chemicals or the disposal of wastes, such as heavy metals, hydrocarbons, and pesticides. Basically, the chemistry of the soil can be amended due to acid precipitation by affecting plants, cultures, and water quality . Moreover, movement of heavy metals is favored by soil acidity, and metals are so then moving into the watery environment. It is known that heavy metals such as aluminum are noxious to wildlife and fishes. Soil quality seems to be of importance, as soils with low calcium carbonate levels are at increased jeopardy from acid rain. Over and above rain, snow and particulate matter drip into watery ' bodies .

VARIOUS IMPACTS OF AIR POLLUTION

Air pollution impacts on everything surrounding usas air is natural resource thst is used by literally everyone either human being or plants and animals.so the pollution of air affects in various manner but we are discussing the following-

1.Impacts on Heath
2.Impacts on Ecosystem and biodiversity
3.Impacts on Environment
4.Impacts on Climate change
5.Impacts on Food production

IMPACTS OF AIR POLLUTION ON HEALTH

The most common air pollutants are ground-level ozone and Particulates Matter (PM). Air pollution is distinguished into two main types:

Outdoor pollution is the ambient air pollution. Indoor pollution is the pollution generated by household combustion of fuels. People exposed to high concentrations of air pollutants experience disease symptoms and states of greater and lesser seriousness. These effects are grouped into short- and long-term effects affecting health. Susceptible populations that need to be aware of health protection measures include old people, children, and people with diabetes and predisposing heart or lung disease, especially asthma. As extensively stated previously, according to a recent epidemiological study from Harvard School of Public Health, the relative magnitudes of the short- and long-term effects have not been completely clarified due to the different epidemiological methodologies and to the exposure errors. New models are proposed for assessing short- and long-term human exposure data more successfully . Thus, in the present section, we report the more common short- and long-term health effects but also general concerns for both types of effects, as these effects are often dependent on environmental conditions, dose, and individual susceptibility.

Short-term effects are temporary and range from simple discomfort, such as irritation of the eyes, nose, skin, throat, wheezing, coughing and chest tightness, and breathing difficulties, to more serious states, such as asthma, pneumonia, bronchitis, and lung and heart problems. Short-term exposure to air pollution can also cause headaches, nausea, and dizziness. These problems can be aggravated by extended long-term exposure to the pollutants, which is harmful to the neurological, reproductive, and respiratory systems and causes cancer and even, rarely, deaths.

The long-term effects are chronic, lasting for years or the whole life and can even lead to death. Furthermore, the toxicity of several air pollutants may also induce a variety of cancers in the long term . As stated already, respiratory disorders are closely associated with the inhalation of air pollutants. These pollutants will invade through the airways and will accumulate at the cells. Damage to target cells should be related to the pollutant component involved and its source and dose. Health effects are also closely dependent on country, area, season, and time. An extended exposure duration to the pollutant should incline to long-term health effects in relation also to the above factors.

Particulate Matter (PMs), dust, benzene, and O3 cause serious damage to the respiratory system . Moreover, there is a supplementary risk in case of existing respiratory disease such as asthma. Long-term effects are more frequent in people with a predisposing disease state. When the trachea is contaminated by pollutants, voice alterations may be remarked after acute exposure. Chronic obstructive pulmonary disease (COPD) may be induced following air pollution, increasing morbidity and mortality . Long-term effects from traffic, industrial air pollution, and combustion of fuels are the major factors for COPD risk .

IMPACTS OF AIR POLLTION ON ECOSYSTEM AND BIODIVERSITY

Ecosystems are impacted by air pollution, particularly sulphur and nitrogen emissions, and ground-level ozone as it affects their ability to function and grow. Emissions of both sulphur dioxide and nitrogen oxides deposit in water, on vegetation and on soils as "acid rain", thereby increasing their acidity with adverse

effects on flora and fauna. Ultimately, acidification affects the ability of ecosystems to provide "ecosystem services", such as for example nutrient cycling and carbon cycling, but also water provision, on which the planet and human life is dependent.

Increased ground-level ozone also causes damage to cell membranes on plants inhibiting key processes required for their growth and development. The loss of plant cover affects us all. Trees and other vegetation absorb pollutants such as excessive nitrogen dioxide, ozone and particulate matter, through their leaves and needles and thereby help to improve air quality. Less plant cover thus means less filtering capacity to clean our air.

Eutrophication, the process of accumulation of nutrients, including nitrogen, in water bodies, often results from air pollution. Nutrient overloads in aquatic ecosystems can cause algae blooms and ultimately a loss of oxygen, and of life. As ecosystems are impacted, so is the biological diversity.

Even worse, ultimately human populations are also affected. Harmful concentrations of pollutants may directly enter our drinking water, notably through ground water seepage. Equally, water quality may be deteriorated as air pollution negatively affects vegetation which helps to naturally filter our water systems. Affected vegetation also has negative consequences on another important ecosystem service: that of capturing carbon and thereby reducing the impacts of climate change.

Hence, air pollution has deleterious effects on both soil and water . Concerning PM as an air pollutant, its impact on crop yield and food productivity has been reported. Its impact on watery bodies is associated with the survival of living organisms and fishes and their productivity potential .

ENVIRONMENTAL IMPACTS OF AIR POLLUTION

Air pollution is harming not only human health but also the environment in which we live. The most important environmental effects are as follows. Acid rain is wet (rain, fog, snow) or dry (particulates and gas) precipitation containing toxic amounts of nitric and sulfuric acids. They are able to acidify the water and soil environments, damage trees and plantations, and even damage buildings and outdoor sculptures, constructions, and statues. Haze is produced when fine particles are dispersed in the air and reduce the transparency of the atmosphere. It is caused gas emissions in the air coming from industrial facilities, power plants, automobiles, and trucks. Ozone, as discussed previously, occurs both at ground level and in the upper level (stratosphere) of the Earth's atmosphere. Stratospheric ozone is protecting us from the Sun's harmful ultraviolet (UV) rays. In contrast, ground-level ozone is harmful to human health and is a pollutant. Unfortunately, stratospheric ozone is gradually damaged by ozone-depleting substances (i.e., chemicals, pesticides, and aerosols). If this protecting stratospheric ozone layer is thinned, then UV radiation can reach our Earth, with harmful effects for human life (skin cancer) and crops . In plants, ozone penetrates through the stomata, inducing them to close, which blocks CO2 transfer and induces a reduction in photosynthesis . Global climate change is an important issue that concerns mankind. As is known, the "greenhouse effect" keeps the Earth's temperature stable. Unhappily, anthropogenic activities have destroyed this protecting temperature effect by producing large amounts of greenhouse gases, and global warming is mounting, with harmful effects on human health, animals, forests, wildlife, agriculture, and the water environment. A report states that global warming is adding to the health risks of poor people .

People living in poorly constructed buildings in warm-climate countries are at high risk for heat-related health problems as temperatures mount . Wildlife is burdened by toxic pollutants coming from the air,soil, or the water ecosystem and, in this way, animals can develop health problems when exposed to high levels of pollutants. Reproductive failure and birth effects have been reported. Eutrophication is occurring when elevated concentrations of nutrients (especially nitrogen) stimulate the blooming of aquatic algae, which can cause a disequilibration in the diversity of fish and their deaths.

IMPACTS OF AIR POLLUTION ON CLIMATE CHANGE

Air pollution and climate change are closely related. Climate is the other side of the same coin that reduces the quality of our Earth . Pollutants such as black carbon, methane, tropospheric ozone, and aerosols affect the amount of incoming sunlight. As a result, the temperature of the Earth is increasing, resulting in the melting of ice, icebergs, and glaciers.

In this way, climatic changes will affect the incidence and prevalence of both residual and imported infections in Europe. limate and weather affect the duration, timing, and intensity of outbreaks strongly and change the map of infectious diseases in the globe . Mosquito-transmitted parasitic or viral diseases are extremely climate-sensitive, as warming firstly shortens the pathogen incubation period and secondly shifts the geographic map of the vector. Similarly, water-warming following climate changes leads to a high incidence of waterborne infections. Recently, in Europe, eradicated diseases seem to be emerging due to the migration of population, for example, cholera poliomyelitis, tick-borne encephalitis, and malaria . The spread of epidemics is associated with

natural climate disasters and storms, which seem to occur more frequently nowadays. Malnutrition and disequilibration of the immune system are also associated with the emerging infections affecting public health.

Last but not least, climate change resulting from environmental pollution affects the geographical distribution of many infectious diseases, as do natural disasters. The only way to tackle this problem is through public awareness coupled with a multidisciplinary approach by scientific experts; national and international organizations must address the emergence of this threat and propose sustainable solutions.

Although the industrial revolution was a great success in terms of technology, society, and the provision of multiple services, it also introduced the production of huge quantities of pollutants emitted into the air that are harmful to human health. Without any doubt, the global environmental pollution is considered an international public health issue with multiple facets. Social, economic, and legislative concerns and lifestyle habits are related to this major problem. Clearly, urbanization and industrialization are reaching unprecedented and upsetting proportions worldwide in our era. Anthropogenic air pollution is one of the biggest public health hazards worldwide, given that it accounts for about 9 million deaths per year.

Without a doubt, all of the aforementioned are closely associated with climate change, and in the event of danger, the consequences can be severe for mankind. Climate changes and the effects of global planetary warming seriously affect multiple ecosystems, causing problems such as food safety issues, ice and iceberg melting, animal extinction, and damage to plants . Air pollution has various health effects. The health of susceptible and sensitive individuals can be impacted even on low air pollution days. Short-term exposure to air pollutants is closely related to COPD (Chronic Obstructive Pulmonary Disease), cough, shortness of breath, wheezing, asthma, respiratory disease, and high rates of hospitalization (a measurement of morbidity).

The long-term effects associated with air pollution are chronic asthma, pulmonary insufficiency, cardiovascular diseases, and cardiovascular mortality. According to a study, diabetes seems to be induced after long-term air pollution exposure. Moreover, air pollution seems to have various malign health effects in early human life, such as respiratory, cardiovascular, mental, and perinatal disorders, leading to infant mortality or chronic disease in adult age . National reports have mentioned the increased risk of morbidity and mortality . These studies were conducted in many places around the world and show a correlation between daily ranges of particulate matter (PM) concentration and daily mortality. Climate shifts and global planetary warming could aggravate the situation. Besides, increased hospitalization (an index of morbidity) has been registered among the elderly and susceptible individuals for specific reasons. Fine and ultrafine particulate matter seems to be associated with more serious illnesses , as it can invade the deepest parts of the airways and more easily reach the bloodstream.

IMPACTS OF AIR POLLUTION ON FOOD PRODUCTION

There is a two way relationship between food production and air pollution: food production contributes significantly to air pollution; in turn, air pollution can impact food production.

Agriculture is the single largest contributor of ammonia pollution as well as emitting other nitrogen compounds. This affects soil quality and thus the very capacity of the soil to sustain plant and animal productivity. In addition, the growing trade in agriculture products in the last few decades has further increased the amount of pollution emitted from the intensification process in producer countries. As this burden remains in the producer country, it creates an imbalance and shifts the pollution problem from the importing countries to the producer countries.

Conversely, there is increasing evidence that food production is also threatened by air pollution. Ozone precursor emissions (nitrogen oxides and volatile organic compounds) are of particular concern for global food security as these compounds react to form ground-level ozone. This, in turn, penetrates into the plant structure and impairs its ability to develop. Ozone was estimated to cause relative global crop losses for soy 6-16%, wheat 7-12% and maize 3-5%. At a European level, a study in 2000 of the economic losses due to the impact of ozone on 23 crops amounted to 6.7 billion Euros.

Some crops have been found to be more sensitive than others to ozone exposure, with wheat and soybean being particularly sensitive; potato, rice and maize being moderately sensitive; whilst barley has been found to be ozone resistant. Of concern is the fact that these most sensitive crops are all staple foods for the majority of the world's population.

Fisheries are also affected as nutrient run-off from land-based sources creates "dead zones", degrading habitat for fish – coral, sea grasses and mangroves – and endangering fish species already vulnerable because of over-fishing and climate change. Yet, globally up to 20 percent of human protein consumption comes from aquatic animals and fisheries are a major source of income and jobs for many communities around the world.

In a world faced with much unrest and uncertainty, global food security is an additional driver of turmoil. Research on the impact of air pollution on food is relatively recent. Yet all indications suggest that reducing air pollution benefits food production and thereby, global food security.

SOME OTHER IMPACTS OF AIR POLLUTION

Air pollution mainly affects those living in large urban areas, where road emissions contribute the most to the degradation of air quality. There is also a danger of industrial accidents, where the spread of a toxic fog can be fatal to the populations of the surrounding areas. The dispersion of pollutants is determined by many parameters, most notably atmospheric stability and wind (6).

In developing countries, the problem is more serious due to overpopulation and uncontrolled urbanization along with the development of industrialization. This leads to poor air quality, especially in countries with social disparities and a lack of information on sustainable management of the environment. The use of fuels such as wood fuel or solid fuel for domestic needs due to low incomes exposes people to bad-quality, polluted air at home. It is of note that three billion people around the world are using the above sources of energy for their daily heating and cooking needs . In developing countries, the women of the household seem to carry the highest risk for disease development due to their longer duration exposure to the indoor air pollution . Due to its fast industrial development and overpopulation, As stated already, long-term exposure is associated with deleterious effects on the cardiovascular system . However, it is interesting to note that cardiovascular diseases have mostly been observed in developed and high-income countries rather than in the developing low- income countries exposed highly to air pollution . Extreme air pollution is recorded in India, where the air quality reaches hazardous levels. New Delhi is one of the more polluted cities in India. Flights in and out of New Delhi International Airport are often canceled due to the reduced visibility associated with air pollution. Pollution is occurring both in urban and rural areas in India due to the fast industrialization, urbanization, and rise in use of motorcycle transportation.

Concerning industrial emissions, collectors and closed systems can keep the air pollution to the minimal standards imposed by legislation. Current strategies to improve air quality require an estimation of the economic value of the benefits gained from proposed programs. These proposed programs by public authorities, and directives are issued with guidelines to be respected.

II. SUMMARY AND CONCLUSIONS

There are many pollutants that are major factors in disease in humans. Among them, Particulate Matter (PM), particles of variable but very small diameter, penetrate the respiratory system via inhalation, causing respiratory and cardiovascular diseases, reproductive and central nervous system dysfunctions, and cancer. Diseases occurring from the aforementioned substances include principally respiratory problems such as Chronic Obstructive Pulmonary Disease (COPD), asthma, bronchiolitis, and also lung cancer, cardiovascular events, central nervous system dysfunctions, and cutaneous diseases. The interactions between humans and their physical surroundings have been extensively studied, as multiple human activities influence the environment. The environment is a coupling of the biotic (living organisms and microorganisms) and the abiotic (hydrosphere, lithosphere, and atmosphere). Pollution is defined as the introduction into the environment of substances harmful to humans and other living organisms. Pollutants are harmful solids, liquids, or gases produced in higher than usual concentrations that reduce the quality of our environment. Human activities have an adverse effect on the environment by polluting the water we drink, the air we breathe, and the soil in which plants grow.

Without a doubt, there is a critical linking of air pollution and environment and hence heath. In the conclusion, all we have to say that we should take steps to reduce air pollution as it is responsibility of government and governmental bodies but also the individuals.

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