Quest Journals
Journal of Research in Environmental and Earth Sciences
Volume 7 ~ Issue 6 (2021) pp: 80-85
ISSN(Online) :2348-2532
www.questjournals.org

Research Paper

Environmental Pollution: Causes and Prevention

Shree Meenakshi.K
[1](Department of Chemistry, Anna University India)
Corresponding Author: Shree Meenakshi.K

ABSTRACT : *Developmental activities such as construction, transportation and manufacturing not only deplete the natural resources but also produce large amount of wastes that leads to pollution of air, water, soil, and oceans, global warming and acid rains. Untreated or improperly treated waste is a major cause of pollution of rivers and environmental degradation causing ill health and loss of crop productivity. In this research paper a study is undertaken about the major causes of pollution, their effects on our environment and the various measures that can be taken to control such pollutions*

KEYWORDS: *Development activities, Natural Resources, Environmental degradation, Crop productivity.*

Received 15 June, 2021; Revised: 28 June, 2021; Accepted 30 June, 2021

I. INTRODUCTION

The pollution of the environment and its natural resources such as water, air or land with different pollutants is known as environmental pollution. The biggest and main harmful effect of pollution is on the environment as it breaks up the environment and also the different ecosystems present in it. It has adverse effects on both the humans and the other environmental living and non-living things. It is a worldwide problem and it causes hazardous effects on humans and natural resources. Environmental pollution is defined as the state of contamination of different natural resources of the environment with the introduction of the poisonous chemicals and gases in the atmosphere of the earth which leads towards the destruction of natural resources of the environment such as land, air or water. The different pollutants which pollute the environment may be regarded as primary or secondary pollutants and the pollutants having short term or long-term effects on the environment due to their vitality and nature of causing damage to the environment. It is the state of the buildup of toxic chemicals and poisonous gases in the breathing zone of the atmosphere of the earth which leads to many harmful disorders and discomforts to all the life species relying on natural resources of the environment. Environment pollution occurs in pollution of different forms of the environment such as land, water, air, noise, thermal, radioactive or light pollution. When the pollutants enter in the different zones of the environment, the species dependent on these natural resources would suffer & face difficulties in surviving. The environment is polluted when the different types of pollutants such as greenhouse gases, harmful heavy metals & harmful chemicals. The pollutants cause the long term as well short-term changes in the environment which have very dangerous effects.

II. POLLUTANTS OF THE ENVIRONMENT

A pollutant is a substance or energy introduced into the environment that has undesired effects, or adversely affects the usefulness of a resource. A pollutant may cause long- or short-term damage by changing the growth rate of plant or animal species, or by interfering with human amenities, comfort, health, or property values. Some pollutants are biodegradable and therefore will not persist in the environment in the long term. However, the degradation products of some pollutants are themselves polluting such as the products 1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene (DDE) and dichlorodiphenyldichloroethane (DDD) produced from the degradation of (dichloro-diphenyl-trichloroethane) DDT.

Environmental pollutants are compounds introduced in the natural environment causing adverse changes, for example, adversely affecting health or causing other types of damage. Among these, pesticides, herbicides, and fungicides are of considerable interest since they have a large-scale use in agriculture. Pesticides are included in a broad range of organic micropollutants that have ecological impacts. Other pollutants are also of general interest in environmental monitoring. For example, polycyclic aromatic hydrocarbons (PAHs) are

well-known anthropogenic pollutants resulting from the incomplete combustion of organic matters. Polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs) are also contaminants of large interest due to their chemical resistance and persistence in the environment. Most of these compounds have been found in all major environmental sectors (air, water, soil). PCBs may enter the atmosphere from transformers, incinerators, landfills, and sludge drying beds. The pesticides can enter the atmosphere due to the current use, or emission/reemission from the various environmental compartments in which they are already present as residues resulting from historical use.

The materials that cause pollution are basically of two types:

1. Persistent pollutants: Those pollutants which remain consistent in the environment for a long period of time without any change in its original form are called persistent pollutants. For example, pesticides, nuclear wastes, and plastics etc.
2. non-persistent pollutants: These pollutants are the opposite of persistent pollutant and break down in the simple form. If this process of breaking down is done by living organisms, then such pollutants are referred to as biodegradable pollutants.

From another perspective, pollutants can be classified as follows:

1. Primary Pollutants: Primary pollutants are those which remain in the form in which they were added to the environment for ex. DDT, Plastic
2. Secondary Pollutants: Secondary pollutants are formed due to interaction of primary pollutants amongst themselves viz. peroxyacyl nitrates (PAN) by the interaction of NOx & hydrocarbons.

According to their existence in nature:

1. Quantitative Pollutants: These substances are already present in the atmosphere but they become pollutant when their concentration level reaches to a particular level which is above a threshold limit.
2. Qualitative Pollutants: These are man-made pollutants e.g., Fungicides, herbicides etc.

Furthermore, they could also be classified as man-made or natural pollutants, and according to their mode of disposal as bio-degradable and non-biodegradable pollutants.

III. TYPES OF POLLUTION

There are various types of pollution chiefly arising as a result of anthropogenic causes. Also contributing to pollution is globalisation, where humanity's constant need for natural resources has slowly started to change the face of the earth. Though the quality of living has drastically improved, other new issues have risen that gradually impact human health and the environment. The well-known pollution types include air, land, water, marine etc. There are other types also which are relatively new but important to understand, these include noise, light, nuclear, thermal, visual pollution etc. All kinds have an impact on the environment.

1. Air Pollution
2. Water Pollution
3. Land Pollution (soil pollution)
4. Noise Pollution
5. Radioactive/ Nuclear Pollution
6. Thermal Pollution, etc
7. Light pollution
8. Marine Pollution/ Ocean Pollution

1. Air Pollution

Air Pollution occur when large number of undesirable gases and particulate matter are found in air. This results in deterioration of air quality, requires control and monitoring. If it is not controlled, it results in diseases, allergies or premature death in humans. In general, it is the contamination of air by smoke, gases (chiefly carbon dioxide, sulphur dioxide, and nitrogen dioxide), suspended particles, particulate matter and other air pollutant. It is directly related to greenhouse effect and global warming which is primarily caused due to carbon di oxide & other greenhouse gases.

- **Effects of Air Pollution**

Air pollution has both direct and indirect impact and effect our lives in different manner. Air pollutants include both point source and non-point source pollution. These pollutants have adverse effect on air quality and thus need to be brought to a minimum. Some of these effects/ results are mentioned below:

Formation of Photochemical Smog: When pollutants like hydrocarbons and nitrogen oxides combine in the presence of sunlight, smog is formed. It forms a yellowish-brown haze especially during winter and hampers visibility. It also causes many respiratory disorders and allergies as it contains polluting gases.

Depletion of Ozone layer: Ozone is known to absorb the Ultraviolet (UV) rays present in the sun's radiation. Ozone layer protects us from the harmful effects of the UV rays. However, hydrocarbons such as the

chlorofluorocarbons (CFCs) destroy the ozone molecules which deplete the ozone layer. Ozone holes have been detected in the atmosphere which permit the UV rays to reach the earth's surface. The harmful effects of the UV rays are visible in the countries such as Australia and New Zealand where the rate of skin cancer is higher than the other regions of the world.

Aerosol Formation: Aerosol is formed by the dispersion of solid or liquid matter in the atmosphere. Aerosols are formed by the pollutant particulate matter like carbon particles. If the aerosols form a thick layer in the troposphere, they affect the weather conditions by blocking the solar radiation. Aerosols are also deposited on the leaves and affect the photosynthesis.

Causes & Sources

The causes include burning of fossil fuels such as coal and petroleum in vehicles, industries and coal based electric power plants. Fossil fuels are being used in large quantities for over centuries in one or other form. Burning of crops, waste and garbage are another equally damaging to the environment. Construction and building activity though do not result in release of harmful gases directly but it adds large amount of particulate matter and other harmful suspended particles which causes pollution. Air pollutants and exhausting fumes from vehicles, heavy metals, natural gas, chemical reactions, the burning of fossil fuels, volatile organic compounds, Radiation spills or nuclear accidents, destructive off-gassing from things such as paint, plastic production, and so on are the major causes.

2.Water Pollution

Water pollution is the contamination of any body of water including lakes, groundwater, sea, oceans, etc. A few examples include lack of sewage treatment, contaminated water, lack or absence of wastewater treatment, presence of heavy metals and waste water running into the lake or streams; Industrial waste drips polluting groundwater, the illicit putting of stuff or items within water bodies etc. The most explicit kind of water pollution affects oceans, lakes, and rivers. It also results in death of water bodies, kill organisms and fish, crabs, birds, seagulls, dolphins, etc. The increased level of contaminants and exploiting existing natural resources has resulted in acute shortage and lack of clean water in many urban areas. It has a direct impact on waste quality as the underground sources also gets affected by those toxic contaminants.

Causes and Sources

Pollution due to daily activities of humans is the main reason behind polluted water. The most polluting type include discharging untreated industrial waste, toxic chemical and sewage into as lakes, ponds and rivers. Plastic materials such as bottles, plastic bag, packaging material also find their way to water bodies which adds to the pollution and adversely affects aquatic life. Another example includes mixing up of high temperature (hot water/ discharge) resulting in sudden change and rise in temperature. Acid rain is also regarded as one of the polluting factors.

Effects of Water Pollution

Water pollution has various impacts on humans and animals. Due to increased contamination, major cities are facing acute water shortage for general purpose and as well as shortage of drinking water. Although major part of world is covered with water bodies, sources of fresh water are very limited. Some of the major effects include: Shortage of potable water, Pollutants and metallic compounds entering into food chain., Increase in water borne diseases such as cholera, diarrhoea, typhoid etc., Loss of aquatic life and plants.

3. Soil Pollution or Land Pollution

Soil Pollution takes place there is large amount of toxic chemicals, pollutants or impurities in the soil. It presents a high risk to plants, wildlife, humans and indeed, the soil itself. Quality of soil has direct impact on the crops and farming because of which crop yield is greatly reduced. Soil pollution is also called as soil contamination, soil degradation or land degradation and changes the characteristics of soil. A high or low pH value, changed chemical composition, loss of nutrients, presence of chemicals, fertilizers, pesticide, herbicides etc are the major causes. Removal of top layer of soil is another form of pollution.

Massive cutting of trees, referred to as deforestation it is a major contributor of land pollution. The roots of trees which binds the soil gets lost with time because of running water and also because of strong winds. In hilly and mountain areas, trees play even a much more important role and keeps big rocks in place. Because of activities such as blasting, cutting of trees and construction in hilly areas, occurrences of landslides have increased.

Causes and Sources of Soil Pollution

The primary cause is the presence of human activities such as industrial waste, agricultural waste, improper waste disposal, accidental oil spills, acid rain, etc. It is a major problem with agricultural areas because of extensive use of human-made waste products which are full of chemicals. Some of the causes are same as that of water pollution like acid rain, discharge of untreated sewage and industrial waste. Additionally, throwing of garbage, especially plastic material such as plastic bags contribute substantially to this kind of pollution since they are non-biodegradable. Burning of crops after harvesting also has negative effect on the soil and it lowers its fertility. Agricultural runoff and surface runoff are also the contributory factor.

Effects of Soil Pollution

Effects include the effect on the health of humans, effect on the growth of plants, decreased fertility, toxic dust, changes in soil structure, etc. It directly affects the quality and quantity of crops. Negative impact on crop production, crop failure and low-quality food, adverse effect on humans and animals because of contaminated food. It might also cause skin problems and pose health risk.

4. Noise Pollution

Noise pollution is an undesirable and harmful noise which has a negative impact on human health and the environment. It has become more of an environmental issue since the industrial age. It is disturbing or extreme noise that can harm the activity or balance of human as well as animal life. It is one of the most common causes of hearing loss in the United States and one of the leading causes of hearing loss and hearing loss in children and adults. Construction, transport and daily human activities all play a role in generating the noise. We are exposed to high sound levels throughout the day, whether at home, at work or in public places such as schools, hospitals, parks, schools and other public places. Noise above 80 – 85 decibels is termed as noise pollution; these standards vary from countries to countries. The standards differ based on the area types such as residential, industrial or commercial etc.

Causes and Sources

The cause of most outdoor noise globally is primarily originated from machines and transportation systems, motor vehicles engines, factory machine sounds, aircrafts, and trains. It results from machines, construction activities, and music performances.

Effects of Noise Pollution

Effects include tinnitus, hearing loss, sleep disturbances, hypertension, high-stress levels, and other destructive effects on humans. It causes uneasiness and damage to living being's mental and physical health. A regular exposure to elevated noise levels can lead to serious health problems for humans and other living organisms. Stress related illnesses, loss of productivity, and even death from heart disease, stroke, diabetes, cancer, heart attack, and heart failure. Other health problems such as heart attacks, strokes, and strokes, if we are exposed to prolonged exposure, especially if we are repeatedly exposed to noise.

5. Radioactive/ Nuclear Pollution

Radioactive or nuclear pollution is a different type of pollution, it is caused because of radioactive contamination (radio-logical contamination). It is not very common in everyday life but of particular concern where radioactive material and radioactive substances are used. The risk of radioactive contamination increases in vicinity of nuclear thermal power plants, factories, in major hospitals etc and can cause serious problems if the radiation and exposure is not controlled. Generally, the use of such harmful substance is very careful manner in controlled environment. This is because of the widespread and long-lasting damage in case of any leak or contact with such substance. Dealing with radioactive waste becomes particularly important because of the lack of safe disposal of such waste, thus mishandling of radioactive waste can cause huge damage.

Other Pollution Types

Light pollution: It is a broad term that denotes many problems that are caused by the pointless use of artificial light. Specific class of light pollution consist of light trespass, over-illumination, glare, light clutter, and sky glow.

Thermal pollution: It denotes the sudden increase or drops off in the hotness of ocean, lake, river, sea or pond by human influence. A general reason of thermal pollution is the use of coolants by power plants and business firms.

Construction Waste: Waste generated due to construction activities in form of debris, fumes, air pollution due to particulate matter etc. Construction waste and other solid waste which is generated due to demolition or new construction activity.

Nuclear or Radioactive pollution: It can happen because of the release of radioactive stuff or high-energy elements into the air, water, or soil on account of excessive human activity, either by mistake or intentionally. Nuclear pollutants and nuclear waste come from nuclear power plants, nuclear weapons, medical equipment and treatments.

Ocean or marine pollution: This is caused because of the pollutants and unwanted material entering into water bodies. It can be result of such material from various lower-level water bodies or direct dumping into oceans. Major causes are marine debris, chemical contamination, plastic pollution etc.

IV. PREVENTIVE MEASURES TO AVOID POLLUTION

Pollution prevention is any practice that reduces, eliminates, or prevents pollution at its source., also known as "source reduction," is the ounce-of-prevention approach to waste management. Reducing the amount of pollution produced means less waste to control, treat, or dispose of. Less pollution means less hazards posed to public health and the environment.

Pollution prevention approaches can be applied to all potential and actual pollution-generating activities, including those found in the energy, agriculture, federal, consumer and industrial sectors. Prevention practices are essential for preserving wetlands, groundwater sources and other critical ecosystems areas in which we especially want to stop pollution before it begins. In the energy sector, pollution prevention can reduce environmental damages from extraction, processing, transport and combustion of fuels. Pollution prevention approaches include:

- increasing efficiency in energy use;
- use of environmentally benign fuel sources.

In the agricultural sector, pollution prevention approaches include:

- Reducing the use of water and chemical inputs;
- Adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
- Protection of sensitive areas.

In the industrial sector, examples of practices include:

- Modifying a production process to produce less waste
- Using non-toxic or less toxic chemicals as cleaners, degreasers and other maintenance chemicals
- Implementing water and energy conservation practices
- Reusing materials such as drums and pallets rather than disposing of them as waste

In homes and institutions practices include:

- Using reusable water bottles instead of throw-always
- Automatically turning off lights when not in use
- Repairing leaky faucets and hoses
- Switching to "green" cleaners

Pollution prevention reduces both financial costs (waste management and cleanup) and environmental costs (health problems and environmental damage). Pollution prevention protects the environment by conserving and protecting natural resources while strengthening economic growth through more efficient production in industry and less need for households, businesses and communities to handle waste.

Environmental Considerations, Rules & Regulations

Environmental law, rules and regulations have been formed all over the world. Environmental Protection Agency, Water Department, Pollution Boards, NGOs and departments have been formed. These agencies or departments forms guidelines, policies and acts to check the pollution levels and pollution control. They also work on collecting data about worst polluted places, hazardous waste sites, changes in pollution levels etc. Rules & regulations in form of acts such as clean air act defines the acceptable level, defines penalties, actions and other requirements to be kept in mind. Depending on the need, such rules are applicable to individuals, business entities, industries, manufacturers and as well as government undertakings.

V. CONCLUSION

There are millions of people worldwide who are affected because of one form of pollution or other. Considering the large impact of various type of pollutions, not only developed countries like needs to be concerned but each and every single individual should care about it. Recycling is gaining importance along with waste reduction & waste management. Alternate and renewable sources of energy are being explored and environmental monitoring is being emphasises. Use of solar energy and wind energy are the most widely used form or renewable energy. It is a collective responsibility to save our natural resources. United Nations Sustainable Development Goals also puts emphasis on saving environment. Policymakers in developing countries need to design programs, set standards, and take action to mitigate adverse health effects of pollution. Healthy people mean human resources are the main object of any successful business or country. These societal beneficial efforts need to carefully adapt available knowledge from other settings, keeping in mind the differences in pollutant mixtures, concentration levels, exposure patterns, and various underlying population characteristics.

REFERENCES

[1]. Avdeev, O. & Korchagin, P. (1994). Organization and Implementation of Contaminated Waste Neutralization in the Ukraine - National Report II, Central. European Journal of Public Health, 2(suppl), pp. 51-52.

[2]. Blaxill, M. F. (2004). What's going on, The Question of Time Trends in Autism. Public Health Reports, 119(6), pp. 536-551.

[3]. Brauer, M., Hoek, G., Smith, H. A., de Jongste, J. C., Gerritsen, J. & Postma, D. S. (2007). Air Pollution and Development of Asthma, Allergy and Infections in a Birth Cohort, European Society for Clinical Respiratory Physiology, 29(5), pp. 879-888.

[4]. British Airways, (1993), Annual Environment Report, London: British Airways plc, Environment Branch, Heathrow.

[5]. Carter, F. W. (1985). Pollution Problems in Post-War Czechoslovakia, Transactions of the Institute of British Geographers, 10(1), pp. 17-44.

[6]. Ciocco, A. & Thompson, D. J. (1961). A Follow-up on Donora Ten Years After: Methodology and Findings, American Journal of Public Health, 51(2), pp. 155- 164.

[7]. Colls, J. (2002). Air Pollution. New York: Spon Press.

[8]. Crisp, T. M., Clegg, E. D., Cooper, R. L., Wood, W. P., Anderson, D. G., Baetcke, K. P., Hoffmann, J. L., Morrow, M. S., Rodier, D. J., Schaeffer, J. E., Touart, L. E., Zeeman, M. G. & Patel, Y. M. (1998). Environmental Endocrine Disruption: An Effects Assessment and Analysis, Environmental Health Perspectives,106(1), pp. 11-56

[9]. Cucu. M., Lupeanu, M. I., Nicorici, M., Lonescu, L. & Sandu, S. (1994). The Dangerous Wastes and Health Risks in Romania: National Report, Central European Journal of Public Health, 2(suppl), pp. 41-43.

[10]. D'Amato, G., Liccardi, G., D'Amato, M. & Holgate. S. (2005). Environmental Risk Factors and Allergic Bronchial Asthma, Clinical & Experimental Allergy, 35(9), pp.1113- 1124.

[11]. DeBarteleven, J. (1992). Eastern Europe's Environmental Crisis. Baltimore, MD: Johns Hopkins Press

[12]. European Public Health Alliance, (2009). Air, Water Pollution and Health Effects. Retrieved from http://www.epha.org/r/54

[13] Firket, J. (1931). The Cause of the Symptoms Found in the Meuse Valley during the Fog of December, Bulletin de l'scademie Royale Medicine de Belgique, 11, pp. 683-741.

[14] Fitzgerald, E. F., Schell, L. M., Marshall, E. G., Carpenter, D. O., Suk. W. A. & Zejda, J. E. (1998). Environmental Pollution and Child Health in Central and Eastern Europe, Environmental Health Perspectives, 106(6), pp. 307-311

[15] Gauderman, W. J., Avol, E., Gilliland, F., Vora, H., Thomas, D., Berhane, K., McConnell. R., Kuenzli, N., Lurmann, F., Rappaport, E., Margolis, H., Bates, D. & Peters, J. (2005). The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age, New England Journal of Medicine, 352(12), pp. 1276.

[16] Sharp, B. M. H. & Bromley, D. W. (1979). Agricultural Pollution: The Economics of Coordination, American Journal of Agricultural Economics 61(4), pp. 591-600.

[17] Spassov, A. (1994). Identification of Problem Related to Solid Wastes in Bulgaria-National Report. Central European Journal of Public Health, 2(suppl), pp. 21-23.

[18] Spilhaus, A. (1966). Waste Management and Control, Report of the Committee on Pollution, National Academy of Sciences-National Research Council, Washington, D. C.

[19] Stein, J., Schettler, T., Wallinga, D. & Valenti, M. (2002). In Harm's Way: Toxic Threats to Child Development, Journal of Developmental & Behavioral Pediatrics, 23(0), pp. S13-S22.

[20] Krześlak, A. & Korytkowski, J. (1994). Hazardous Wastes in Poland-National Report, Central European Journal of Public Health, 2(suppl), pp. 44-40.

[21] Künzli N., Kaiser, R., Medina, S., Studnicka, M., Chanel, O., Filliger, P., Herry, M., Horak, F. Jr., Puybonnieux-Texier, V., Quénel, P., Schneider, J., Seethaler, R., Vergnaud, J-C. & Sommer, H. (2000). Public Health Impact of Outdoor and Traffic Related Air Pollution: A European Assessment, The Lancet, 356(9232), pp. 795-801

[22] Landrigan, P. J., Schechter, C. B., Lipton, J. M., Fahs, M. C. & Schwartz, J. (2002). Environmental Pollutants and disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental disabilities, Environmental Health Perspectives, 110(7), pp. 721-728.

[23] Lenkova, K. & Vargova, M. (1994). Hazardous Wastes in the Slovak Republic-National Report, Central European Journal of Public Health, 2(suppl), pp. 43-48.