



Chemical Pollution & Its Impact on Environment & Humanity.

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ABSTRACT:

Chemicals play an important role in development. But in the form of chemical pollutants, it poses a serious threat of chemical pollution to the environment. In the present work entitled Chemical pollution, an attempt has been made to cover information about chemical pollution & its hazardous impact on the environment & humanity.

KEYWORDS: Chemical pollution, chemical intoxication, Environmental pollution, oil spill.

1.0] INTRODUCTION:

Development is occurring on a larger scale day by day. In this development Chemicals also play an important role. Chemical production is also happening on a large scale. More than 140,000 chemicals & mixtures of chemicals have been synthesized by humans (UNEP 2019)¹. But on the other hand, it is also giving rise to pollution because of harmful by-products. Pollution in any form is dangerous to humanity as well as to the environment. The contamination of air, water, etc. because of a substance or action or introduction of a harmful substance into nature is called pollution. While the pollution caused because of the introduction of chemical pollutants in nature can be called Chemical pollution. Chemical pollutants are mostly manmade. For example, insecticides (DDT, Organochlorides, organophosphates, etc.), pesticides (Metaldehyde, Boric acid, etc.), oil products & PAHs (polycyclic aromatic hydrocarbons). Generally, we find organic & inorganic chemicals & most of the time these chemicals are the main cause of chemical pollution.

There are different sources of chemical pollutants. But it mainly comes from human activities such as mining, manufacturing, handling, storing & disposal of chemicals, agricultural waste, etc.² According to Rockstrom et al (2009) chemical pollution is one of the planetary boundaries which we must not cross in order to safeguard humanity³. As per the Cefic Report 2022, the world chemicals sales in 2020 are valued at 3,471 billion euro⁴. Also, there is the production of new synthetic chemicals is occurring.⁵ In India pesticide production was stagnant during 206-17 (214 MT) to 2018-19 (217 MT). But it increased in 2020-21 (255 MT). Similar was the case of organic chemicals production in India. During 2016-17 it was 1638 MT & in 2020-21 it was 1906 MT (production in '000mt). The size of the global chemical industry exceeded US \$ 5 trillion in 2017 & is projected to double by 2030 (UNEP 2019). There is a reduction in the risk of some of the chemicals & waste because of international treaties & voluntary instruments. But still, there is uneven progress & there are implementation gaps. But we must have a balance between development & environmental protection. As chemical pollutants are involved in almost every type of pollution. Chemical pollution not only has a harmful impact on humanity but also on the environment. Chemical incidents happening in the world also lead to chemical pollution. These chemical incidents can happen because of natural events (volcanos, earthquakes, forest fires) or due to accidental events. India witnessed the biggest chemical disaster "Bhopal Gas Tragedy" in 1984. In this incident, over 2500 people died because of the accidental release of Methyl isocyanate⁶. To tackle chemical pollution & to protect human & environmental health, sound management is needed.

2.0] SOURCES OF CHEMICAL POLLUTION:

- Human activities: activities performed by humans because of which chemical pollutants enter into the environment are as follows-
 - A. activities such as construction, mining & smelting, transportation, etc.
 - B. use of pesticides & insecticides in agriculture.
- Chemical industries: Waste generated by various industries such as Inorganic & organic chemical Industries, fertilizer industries, refineries & petroleum industries, etc. act as chemical pollutant & leads to chemical pollution.
- Chemicals used in house: chemical products & mixtures used in house such as disinfectants, detergents, when released into environment act as chemical pollutant & leads to pollution.
- Natural events: events occurring in nature such as forest fire, volcano, etc. also leads to chemical pollution.

3.0] IMPACT OF CHEMICAL POLLUTION:

3.1] Impact on environment:

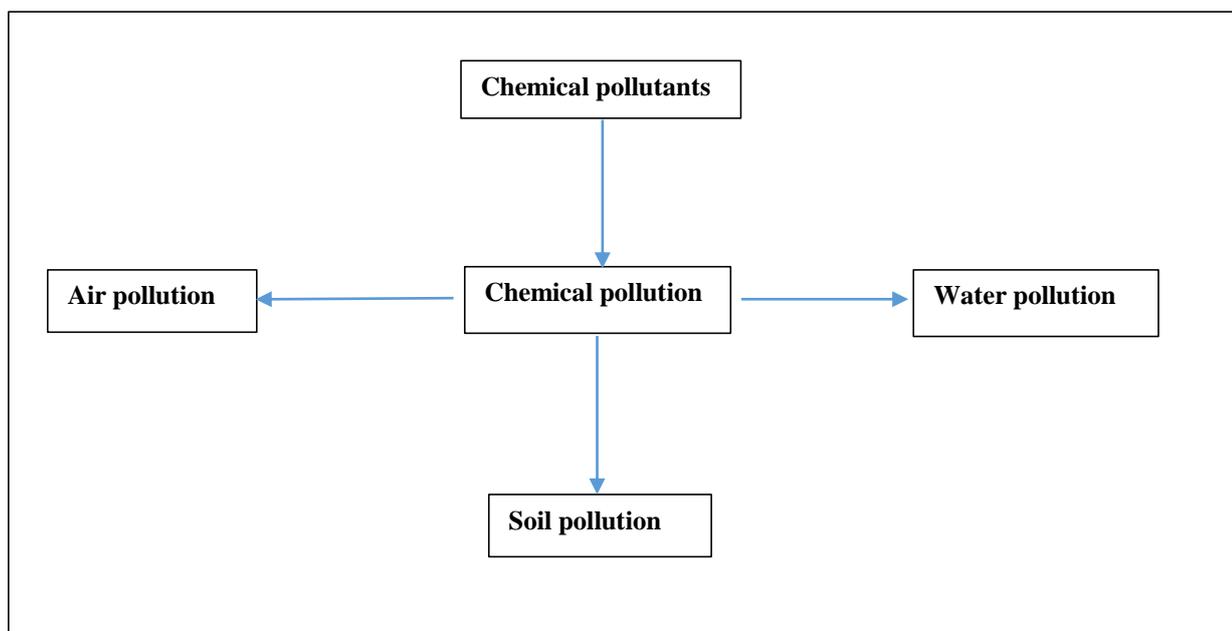


Fig. 1: Chemical pollution & it's interrelation with other forms of pollution.

As chemical pollutants enter into environment it contaminates either water, soil or air. Figure 1 shows relation of chemical pollution & other forms of environmental pollution.

- Hazardous gases such as Nitrous oxide, Carbon monoxide, Hydrocarbons get released into environment & causes air pollution. Sulphur & nitrogen oxide particles in air can create acid rain when they combine with water & Oxygen in the atmosphere. This acid rain causes damage not only to living things but it also lead to decay of buildings & monuments. Air pollution ultimately leads to rise in temperature which contributes to Global warming.



- Industrial waste generated when got released into water bodies, causes water pollution. The most common categories of chemical pollutants involved in the contamination of water bodies are oil, toxic metals & persistent organic pollutants. Incidents of the oil spills have also been observed globally which leads to water pollution. A few of the globally occurred oil spill incidents are mentioned below (a-f) ⁷:

- a) Amoco Cadiz oil spill (1978)
- b) Castillo de Bellver oil spill (1983)
- c) Persian Gulf War oil spill (1991)
- d) Kolva River spill (1994)
- e) BP's Deepwater Horizon oil spill (2010)
- f) Ennore oil spill or Chennai oil spill (2017)

Contaminated water due to chemical pollutants causes the death of aquatic animals like fish.

- Excessive use of fertilizers pollutes the soil. It can also degrade soil fertility. So such land will not remain fertile anymore & it will result in low soil yield. It compromises food production & food quality. This situation poses a threat of reduced food availability & security in a less developed country because of the loss of productive land⁸. In India, it was found that most of the heavy metal accumulation in the soil is found in lands that are near industrial areas. Cr, Cd, Ni, Pb, Zn, and Sn are those heavy metals which got accumulated in agricultural lands present near industrial areas in India. Due to agricultural runoff, toxic chemical pollutants present in the soil enter into water bodies & it affecting the life of the aquatic ecosystem.

- Excessive use of agrichemicals is leading to substantial loss of biodiversity on earth. Because of the neonicotinoid pesticide loss of the honeybee community occurred globally & it resulting in international crisis for crop pollination.⁹

3.2] Impact on humanity:

Chemical pollutants are present almost everywhere in environment. So it becomes difficult to avoid exposure with these pollutants. These chemical pollutants enter into human body via inhalation, ingestion or dermal absorption. Effects occurring because of getting exposed to these pollutants are mentioned below:

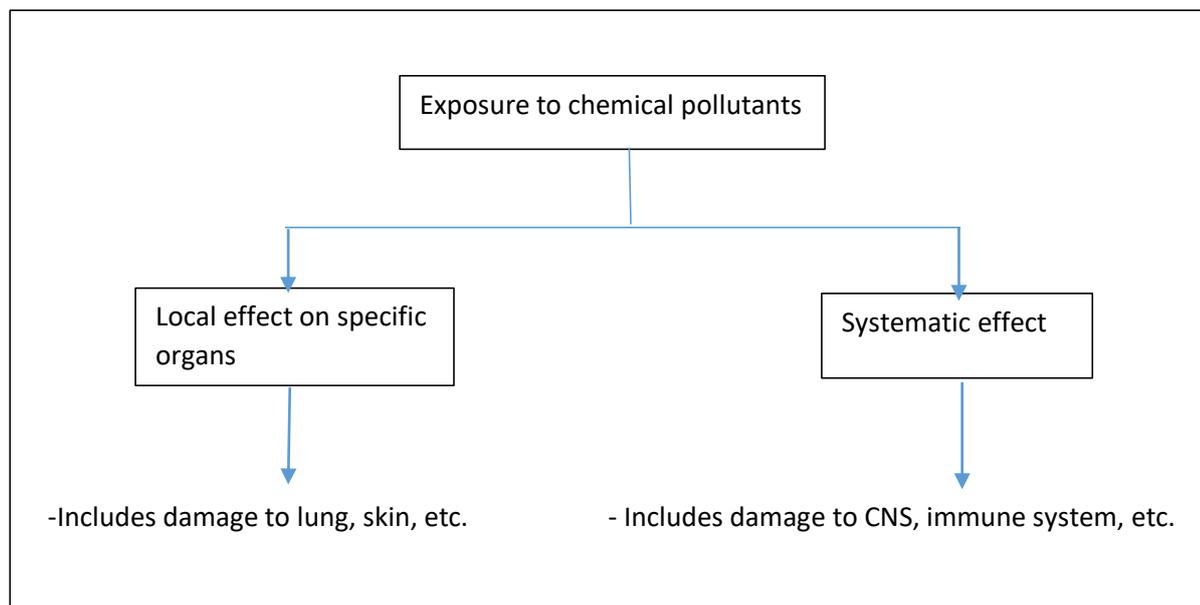


Fig. 2: Effects showed by chemical pollutants.

There are certain chemical pollutants that can cause cancer, affect DNA (mutagenic effects), or can cause physical birth defects.

Chemical intoxication occurs because of getting exposure to chemical pollutants. The severity of the hazard depends on the nature of the pollutant. It can have immediate or delayed effects. Severe chemical intoxication may also cause the death of a person. Neurotoxins present in the environment have also proven fatal to human intellectual ability & may also lead to attention deficit hyperactivity disorder (ADHD). Globally, increased incidences of Parkinson's disease, and multiple sclerosis has also been found. Upon getting exposure to metalloids & certain chemical pollutants, neurodegenerative disorders, and Alzheimer's disease may also occur in human beings. Chemical pollutants have also shown its effect on human fertility and foetal health. Because of the use of certain pollutants such as aromatic hydrocarbons, dioxins, etc., it is found that male fertility has declined by half or even more than that globally.

NOTE: This is an informative article. The author does not have competing interests.

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