

Mini Review

Pollutants: issues and challenges in public safety

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ABSTRACT:

During the past two decades, the issue of environmental pollution has received increased attention and support at both the scientific and public levels. Pollution has spread to the Earth's atmosphere resulting in devastating natural disasters such as earthquakes, hurricanes and tidal waves such as Tsunami. Global warming caused by the accumulation of carbon dioxide and other gases and toxins from factories and car exhausts led to high temperatures to unacceptable limits affecting all over the world and is getting worse in developing countries. Humans stay healthy due to the safety and cleanliness of the environment in which they live. The more pollution in the environment in which humans live, the more vulnerable they are. The environmental pollution is unfortunately accelerated in our environment today for many reasons. Micro, chemical, or radiation contamination of food and water have caused significant pollution in the environment. This has spoiled the quality of life and became the greatest threat to the world, whether industrial or non-industrial, because pollution passes on all countries and there are no limits preventing it and it was necessary to address this great danger coming to our natural world.

Keywords:

Pollutants, Challenges, Public safety.

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INTRODUCTION

Environmental pollution

Although environmental pollution has been recognized for hundreds of years, it has grown and emerged clearly in the wake of the industrial revolution of the eighteenth century because it brought with it the technological advances that produced so many waste from excessive use of production processes, which may be sometimes irregular (Ghreibeh and Khalif, 2010). Based on this, the scientific concept of environmental pollution is regarded to have a close link between pollution and the nature (ecology). The efficiency of this system is greatly reduced when there is a change in the harmonic movement between the different elements resulting in changes in the composition of the elements of the system leading to a disruption of the system's main work (Licata *et al.*, 2004). Hence, environmental pollution means the addition of an element that does not exist to the set of elements of the ecosystem, reduces the presence of one element of the system in a way that adversely affects the functioning of the ecosystem and confuses the state of stability that was used to be in it. Thus, environmental pollution has taken a great deal of attention at the level of governments, international organizations, humanitarian organizations, individuals and since the end of the Second World War in particular, with devastating consequences on various econom-

ic, human and environmental levels, which have extended their effects until recently (Tarbouche *et al.*, 2004).

Biological pollutants (biological pollution)

Biological pollution is a term that emerged in the early 1980s. Contaminants in biological pollution are different reproductive bodies such as viruses, bacteria and parasites (Amal, 2011). They as a result of human intervention and activities while dealing with the surrounding environment, and biological pollution is based on the following principle:

- Entry humid bodies in to the human body or the medium in which they live and multiply. The introduction of new objects into the ecosystem like an is alien invasion and are incorporated into the composition of some of the constituent species of this system. (Yan and Sben,2010). One of the most prominent examples of biological pollution is the waste of industrial processes in organic technology, in the activities of the pharmaceutical industry, especially during the manufacture of antibiotics and pollination materials.

The microbial wastes and the nutrients of the different microorganisms are included in the contents of microbiological industries. Microorganisms exist everywhere, i.e. in the air, water, soil, animals, and even in humans. Some are useful, such as those used in food industries, some of which cause damage to food, some of which are satisfactory or harmful, which can cause



Figure 1. Environmental pollution



Figure 2. Pollution by hospital wastes

diseases such as foodborne diseases (UNEP, 2017). There are three types of microorganisms that can contaminate food and cause foodborne diseases: bacteria, viruses and parasites. The other group of microorganisms that must be taken into account are the fungi, which include yeast and mold, Food spoilage and contamination caused by mycotoxin (a secretion) produced by species like *Penecillium*, *Aspergillus* and *Fusarium* are secondary metabolites synthesized when grown on food or feed containing carbohydrates. These molds may invade crops in the field or grow on food when stored in appropriate conditions of humidity and temperature (Gun and Satu, 2007; Halima *et al.*, 2017).

About 400 types of fungal toxins have been identified but the most dangerous aflatoxins are noteworthy apart from ochratoxin, zerralenone, and deoxynivalenol. In many countries of the world, fungal toxins have been estimated and are currently the most dangerous contaminants in food and feed (Marie *et al.*, 2016; ALHaddad *et al.*, 2016). Several studies have

reported the presence of aflatoxins in food such as corn, peanuts, nuts and spices which at high levels in the diet have severe chronic health effects in animals and humans (Proctor *et al.*, 2004; Halima *et al.*, 2018).

Pollution with pesticides and residues

Humans are exposed to many environmental pollutants, some of which pose a direct threat to their lives while others find their way to air, water and soil, and then move to the food chain, whether plant or animal, and harm their health (Gabriel-Alin *et al.*, 2016). Pesticides are the most important environmental problems faced by modern humans (Chakraborty and DAS, 2014). Instead of providing food with energy and health, food contaminated with pesticide residues has caused many diseases because of their accumulation and multiplication in the living cells. The concentration of chemical pollutants increases tens and hundreds of times as they pass through food chains to humans, increasing their concentration in living tissues day by day as they become more consumed, leading to health problems



Figure 3. Pollution with pesticides



Figure 4. Pollution with oil

such as various types of cancer and other dangerous illness (Naveen *et al.*, 2012).

Pollution with oil derivatives

Fossil energy (oil and its derivatives) is one of the direct cause of pollution, but it is necessary and indispensable, and has no alternative to the price of licenses and other privileges, causing the basis of the problem (Shabaa, 2002). The origin of oil is from the accumulation of remnants of living organisms embedded in the ground for millions of years, provided with appropriate conditions of pressure and heat (Fingas, 2015). It is then dissolved and converted to the oil in the ground inside in the sandstones, and flow in the form of liquid complexes and found in the ground below the surface of a stone-lined gas-topped and under water (oil is less dense than water) and thus the oil and gas are located in non-porous rock areas (Guadalupe *et al.*, 1991). The excessive use of oil and its derivatives increases the environmental pollution and the more the use of this resource in

large proportion increases pollution, and the development and technological development depends mainly based on the oil resources, which means an increase in the percentage of pollution (Khalaf and Mahmoud, 2017). The use of oil derivatives has an impact on the environment and on sustainable development; the most important negative factors such as the impact on human health, air and water pollution, acid rain and global warming Fingas (2015) is to be considered important.

Radiation pollution and heavy elements

A person faces a high risk of exposure to radioactive elements and the biological effects and health risks caused by these elements may have a significant impact on their life and may be reflected on future generations. The damage to the human body due to exposure to radioactive materials depends on several factors (Aljasas, 2011). The dose of these radioactive materials, the type of radiation and the exposure time. Radioactive elements are those elements whose nuclei are unstable.



Figure 5. Pollution with heavy elements



Figure 6. Pollution caused by wars

When the nucleus is exposed to corrosion radiation occurs and sooner or later the nuclei of other new elements become more stable. This process is radioactivity or radioactive decay. Sources of radioactive contamination are the following (Karasov, 2004):

- Natural sources such as cosmic rays and the terrestrial environment in which radioactive materials are spread through the earth crust and radioactive materials close to the surface of the earth and in water.
- Industrial sources, including atomic explosions, nuclear reactors, radioactive sources for medical purposes and industrial radiation sources such as radiation used in sterilization of food and medicine.

Medical contamination

The treatment of drugs whether intended for treatment or unintentional, leading to a high proportion

of medicine in the body, which negatively affects the various activities of the body. It is dangerous that in most cases this effect is fatal and is the most important source of medical contamination are substances that cause buzz and hallucinations, antibiotics and drug interactions causing side effects (Harb, 2011).

In addition to medical waste, the materials used for diagnosis or care of patients inside or outside the health facility, blood and fluids of the patient's body directly or indirectly, any material or object from a patient infected with infectious disease or non-infected and intended to be disposed of, are regarded as waste, And should be disposed of properly by means of incinerators, ovens, sterilization, etc., except for the foods and papers consumed by patients during the periods of their care (Tarbouche *et al.*, 2004).



Figure 7. Water pollution in Basra



Figure 8. Fish mortality due to water pollution

Pollution and biological terrorism

It is the intentional cultivation or production of natural or genetically modified pathogens from bacteria, fungi, viruses or their toxic products (toxins) or any other harmful substances resulting from them, with a view in spreading the disease in humans, animals or plants leading to their elimination. Biological weapons have an ancient history and have been used in wars (Sawahel, 2005). These microbes have a high ability to infect, spread, grow, reproduce and resist antibiotics. They are relatively cheap and require easily accessible materials and equipment. These pathogenic microbes can seep into the surrounding environment and spread to the air due to random wind movement, The types of biological weapons vary according to the type of target organism, namely, human beings, economic animals and crops, ecosystems and natural resources such as wells, rivers and air (Kubba, 2004).

Water pollution

Water pollution is any physical or chemical change in water quality, directly or indirectly, which adversely affects living organisms or makes water unsuitable for further uses and water pollution has a significant impact on the lives of the individual and the family. Water is a vital requirement for humans and other

living organisms. Water may be a major cause to end the life forms if it is polluted. Water pollution has been known since time immemorial, but water pollution has begun to take a serious and qualitative turn since the beginning of the industrial revolution of the last two centuries (Al-Battat, 2009). The dumping of industrial, medical and household waste directly in the Tigris and Euphrates rivers without undergoing treatment and recycling is one of the main causes of water pollution.

The water pollution rates have increased recently, According to the reports of the Iraqi Ministry of Environment, high salinity percentage because of the salts concentration up to 40% in addition to toxic chemicals from factory wastes, hospitals and thermal power stations threaten the aquatic environment, fisheries and human life (www.annabaa.org, 2018). The use of the remnants of the massacres as feed for fish and throwing them into the rivers pollute the aquatic environment and increase health risks, and the use of inappropriate veterinary drugs by has led to an increase in the losses and the rates are very high and exacerbate the crisis. In addition, many hospitals have received hundreds of cases resulting from the triad of water such as poisoning and diarrhea, especially in children, kidney diseases and urinary tract in adults, as well as skin diseases such as rash and

others, some of which directly affect the lives of those infected (UN, 2018). However, the real disaster occurred in 2018 in the province of Basra, which led to the poisoning of thousands of people due to water pollution, with 17 thousand cases of colic infection and diarrhea in just two weeks because of contaminated water (www.yaqein.net, 2018).

The role of the government in the face of pollution and international conventions

The governmental administrative bodies concerned with environmental affairs play a major role in the management of the development of urban areas that are degraded from an environmental perspective. There are different bodies whose responsibilities vary depending on the nature of the service, and the reduction of the effects of pollution and despite the variation of these bodies, both in terms of the nature of activities or dependence, but they all play an important role in the management of urban development and environmental protection from pollution, There are also many international conventions of international bodies and organizations whose laws have been established to prevent and reduce environmental pollution. (UN, 2003).

1. Conventions of the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Program (UNEP): Rotterdam convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in International Trade.
2. Conventions of the International Labor Organization (ILO): Convention 136 to protect against the dangers of gasoline poisoning and convention 139 for the prevention and control of work-related hazards as a result of carcinogenic substances and the convention 148 to protect workers from hazards due to work in the work environment due to air pollution and noise oscillations and other conventions
3. Conventions of the International Maritime Organization (IMO): the Convention on the prevention of

pollution from ships, the convention on oil pollution preparedness, response and cooperation and its protocol and the convention on the control of harmful regulations for the prevention of offenses in ships and others.

4. OPCW Conventions: The convention on the prevention of the development, production, stockpiling and use of chemical weapons and their destruction was ratified on 3 September 1992. The purpose of the convention is to prevent the use and disposal of chemical weapons of mass destruction, including toxic chemicals accessories, especially designed ammunition and special equipment.
5. UNEP conventions such as the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer.
6. Regional conventions: the UNEP regional seas conventions and the barcelona convention for the protection of the marine environment and the coastal region of the Mediterranean.
7. United Nations Economic Commission for Europe (UNECE): European Agreement on the International Carriage of Dangerous Goods by Land and Convention on Long-Range Transboundary Air Pollution and its Protocols .
8. OSPAR Committee: The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) was ratified on 22 September 1992 to replace the 1972 Oslo Convention for the Prevention of Marine Pollution by dumping ships and aircraft waste and the 1974 Paris Convention for the Prevention of Marine Pollution from Land-based Sources.
9. Helsinki Committee: The Helsinki Convention for the Protection of the Marine Environment of the Baltic Sea Region was ratified on 9 April 1992 to replace a previous convention ratified in 1974 and entered into force in 1988. Its aim is to protect and

improve the marine environment of the Baltic Sea region .

10. North American Commission on Environmental Cooperation (NACEC): The North American Convention on Environmental Cooperation entered into force on January 1, 1994 and was regarded as a side agreement of the North American Free Trade Agreement to address general issues related to the serious environmental and health effects that may accompany Free trading.

CONCLUSION

There are many sources of pollution represented by biological and chemical pollutants as radioactive materials and heavy elements in addition to biological terrorism. The most deadly and destructive issue posing threat to the environment is the use of biological weapons leading to the spread of epidemics among humans and animals such as anthrax, smallpox, plague, cholera, bird flu, genetic disorders and abnormalities of embryos. There are loud voices in the international community to control weapons of mass destruction because it causes a grave danger to mankind and the environment. Failure to prevent biological attacks could degrade genetic diversity in animals, plants and serious consequences are dire on nature.

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