الأسبوع الأول

Chapter one (Environment)

1.1 Introduction

This course (Radiation Pollution) will focusing and discussing the sources of radiation pollution, types of radiation pollution, methods and devices (detectors) for radiation detection, units of radiation dose measurements, effects of radiation on environment and life, also the methods of prevention of radiation exposure and newly methods to reduce and remediate the radiation pollution will study as well. In addition, this course will be focus on the best ways to manage and immobilizing the radioactive waste (waste management).

1.2 The Environmental Definition

The environment includes the human and natural world and its surroundings, which consist of the atmosphere, hydrosphere and lithosphere. Human beings are very dependent on the environment. The atmosphere provides us with the air we breathe, the hydrosphere provides the water we drink, and the soil of the lithosphere provides us with the food that we eat. In addition, the environment provides us with raw materials to fulfill our other needs: the construction of housing; the production of consumer goods, etc. In a view of these important functions, it is imperative that we maintain the environment in a state that is as sustainable as possible. Fouling the environment by the products of our industrial society (called pollution) may have many harmful consequences, the damage to human health being of greatest concern.

For that, environmental science is defined as a branch of science (Biology, Chemistry and Physics) focused on the study of the

relationships of the natural world and the relationships between organisms and their environments.

At this current time, the world around us is changing at a very rapid pace. Some changes are beneficial, but many of the changes are causing damage to our planet. The field of environmental science is valuable resources for learning more about these changes and how they affect the world we live in. Let's examine a major change that is currently occurring and its relationship to environmental science. The large change is the dramatic increase in the number of humans on earth. For most of human history, the population has been less than a million people, but the current population has increased to over seven billion people. This equals out to seven thousand times more people.

Due to this increase in the human population, there has also been an increase in pressure on the natural resources and ecosystem services, which we depend on for survival. Natural resources include a variety of substances and energy sources that we take from the environment and use. Natural resources can be divided into renewable and nonrenewable resources. Renewable natural resources are substances that can be renewal over a period, such as sunlight, wind, soil, and wood. On the other hand, nonrenewable natural resources are substances that are in finite supply and will run out. Nonrenewable resources include minerals and crude oils. Then the increase in the human population, natural resources are being used up at a more rapid rate than in the past. Although renewable natural resources can be replenished, when they are used too rapidly, they cannot be replenished fast enough to meet human demand. Even worse, when nonrenewable natural resources are used too rapidly, they become closer to running out completely and being gone forever.

Natural resources have been referred to as the goods produced by the environment, and in this respect, ecosystem services are the 'facilities' that we depend on to help produce the goods. Ecosystem services are the environment's natural processes that provide us with the resources we need to support life. Common ecosystem services include water and air purification, nutrient cycling, climate regulation, pollination of plants, and the recycling of waste. Just like some natural resources, ecosystem services are also limited and can be used up if not regulated.

1.3 Environmental Pollution, it Sources and Effect

Environmental pollution has become a considerable problem threatening the life of people, animals and other living species. Thousands of waste sites around the world contain different pollutants and toxins, particularly heavy metals and radioactive elements. These sites pose a serious threat to all living organisms, and humans in particular. Environmental pollution can be defined as any discharge of material or energy into water, land and air, or can be due to introduction of contaminants into the natural environment that causes adverse changes, or may cause acute (short-term) or chronic (long-term) detriments to the Earth's ecological balance, or that lowers the quality of life. Pollutants may cause primary damage, with direct identifiable impacts on the environment, or secondary damage, in the form of minor perturbations in the delicate balance of the biological food web that are detectable only over long time periods

Environmental Pollution Sources

The industrialization of society and the explosion of the human population have changed the ecological system dramatically.

The random discharge of untreated industrial and domestic waste into waterways; the release of thousands of tons of particulates and airborne gases into the atmosphere;

The use of newly developed chemicals without considering potential consequences, have resulted in major environmental disasters, including the formation of smog and the pollution of large areas of the sea.

Introducing of chemical, physical or biological materials into fresh or seawater that degrading the quality of the water and affect the organisms living in it.

The most dangerous type of pollution is radioactive contamination that results from the detonation of nuclear devices and other nuclear fallout. Nuclear fallout typically occurs from leaks from nuclear power plants, and from conventional weapons using depleted uranium.

Nuclear explosion create radioactive dust and ash, consisting of materials either directly vaporized by a nuclear blast or charged by exposure, a highly dangerous radioactive contamination. It can lead to contamination of the environment and has a devastating effect on ecosystems years after the initial exposure.

Other sources of radiation include spent fuel from nuclear plants, and by-products of mining operations and experimental research laboratories.

Environmental Pollution Effect

Pollution effects are indeed many and wide-ranging, high levels of pollution may causing a lot of damage to human & animal health, trees (tropical rainforests), as well as the wider environment,

All types of pollution (radiation pollution, heavy metals and toxins) have an impact on the living environment,

The effects in living organisms may range from mild discomfort to serious diseases such as cancer and genetic mutation (congenital malformation or physical deformities).

The effect of pollution on human maybe causes:-

- Reduced lung functioning
- Irritation of eyes, nose, mouth and throat
- Asthma attacks
- Respiratory symptoms such as coughing
- Increased respiratory disease
- Reduced energy levels
- Headaches and dizziness
- Cardiovascular problems
- Cancer
- Premature death
- genetic mutation (congenital malformation)
- Damage to the nervous system
- Liver and kidney damage
- Damage to the DNA

The effect of pollution on animals and plant maybe causes:-

- Acid rain destroys fish life in lakes and streams (rivers)
- Excessive ultraviolet radiation coming from the sun through the ozone layer in the upper atmosphere which is eroded by some air pollutants, may cause skin cancer in wildlife
- Ozone in the lower atmosphere may damage lung tissues of animals
- Nutrient pollution (nitrogen, phosphates etc) causes overgrowth of toxic algae eaten by other aquatic animals, and may cause death; nutrient pollution can also cause outbreaks of fish diseases
- Oil pollution (as part of chemical contamination) can negatively affect development of marine organisms, can also cause liver damage, kidney damage, and damage to the nervous system
- Acid rain can kill trees, destroy the leaves of plants
- Ozone holes in the upper atmosphere can allow ultraviolet radiation from the sun to enter the Earth causing damage to trees and plants
- Ozone in the lower atmosphere can prevent plant respiration by blocking stomata (openings in leaves) and negatively affecting plants' photosynthesis rates which will stunt plant growth
- The radiation pollution effects vary depending on the amount of radiation to which we are exposed and on the sensitivity of each exposed individual. Thus, while exposure to high amounts of radiation almost always generate serious diseases (cancer)
- Cancer due to radiation exposure at lower doses usually develops years after the actual exposure; lung cancer is a typical example of the effect of exposure to radon (Helium Nuclide).

1.4 Type of Pollution (Pollutants)

There are many types of environmental pollutants, this is including

1. Radiation Pollution

Radiation occurs naturally in the environment; Natural radiation exists everywhere around the Earth in different levels, but radiation pollution is the most dangerous type of pollutions.

2. Heavy Metals Pollution (Sold, Liquid, Gas)

Heavy metal pollution (in each state) is a problem associated with areas of intensive industry. However, roadways and automobiles are now considering as one of the largest sources of heavy metal pollution.

3. Toxins (Sold, Liquid, Gas)

Toxic and non-biodegradable pollutants released into the environment by industrial, mining and agricultural activities.