

DEFINITION OF AIR POLLUTION

Air pollution is a type of environmental pollution that affects the air and is usually caused by smoke or other harmful gases, mainly oxides of carbon, sulphur and nitrogen.

In other words, air pollution is the contamination of air due to the presence or introduction of a substance which has a poisonous effect.

Many of the world's large cities today have polluted air or low air quality

major air pollutants

The common air pollutants are:

- **Particulate matter (PM10 and PM2.5)**
- **Ozone (O3)**
- **Nitrogen dioxide (NO2)**
- **Carbon monoxide (CO)**
- **Sulphur dioxide (SO2)**

Control of air pollution

- Conserve energy - at home, at work, everywhere.
- Look for the ENERGY STAR label when buying home or office equipment.
- Carpool, use public transportation, bike, or walk whenever possible.
- Follow gasoline refueling instructions for efficient vapor recovery, being careful not to spill fuel and always tightening your gas cap securely.
- Consider purchasing portable gasoline containers labeled "spill-proof," where available.
- Keep car, boat, and other engines properly tuned.
- Be sure your tires are properly inflated.
- Use environmentally safe paints and cleaning products whenever possible.
- Mulch or compost leaves and yard waste.
- Consider using gas logs instead of wood.

Definition of water pollution

Water pollution is the contamination of water bodies, usually as a result of human activities. Water bodies include for example lakes, rivers, oceans, aquifers and groundwater. Water pollution results when contaminants are introduced into the natural environment. For example, releasing inadequately treated wastewater into natural water bodies can lead to degradation of aquatic ecosystems. In turn, this can lead to public health problems for people living downstream. They may use the same polluted river water for drinking or bathing or irrigation. Water pollution is the leading worldwide cause of death and disease, e.g. due to water-borne diseases.

Different sources of water pollution

Sewage (Waste Water)

Sewage is another name for waste water from domestic and industrial processes. Despite strict regulatory control, the Environment Agency data shows that the water and sewage industry accounted for almost a quarter of the serious water incidents in England and Wales in 2006.

Agricultural Pollution

The agriculture industry covers 76% of the land area of England and Wales. Agricultural processes such as uncontrolled spreading of slurries and manure, disposal of sheep dip, tillage, ploughing of the land, use of pesticides and fertilisers can cause water pollution. Accidental spills from milk dairies can also affect the quality of water.

Oil Pollution

Every year there are about 3,000 pollution incidents involving oil and fuels in England and Wales. Oil spillages affect water quality in a number of ways. Oil can make drinking water unsafe to drink. A substantial amount of oil released into oceans and seas will destroy wildlife and the ecosystems that sustain

them. Oil spills also reduce oxygen supplies within the water environment. The main causes of oil related water pollution are:

- loss from storage facilities
- spillage during delivery and;
- deliberate disposal of waste oil to drainage systems

Radioactive Substances

Radioactive waste is another source of water pollution. Radioactive substances are used in nuclear power plants, industrial, medical and other scientific processes. They can be found in watches, luminous clocks, television sets and x-ray machinery. There are also naturally occurring radioisotopes from organisms and within the environment. If not properly disposed of, radioactive waste can result in serious water pollution incidents.

River dumping

Lots of people dump supermarket trolleys, bicycles, garden cuttings and electronic waste into rivers or river banks. This is illegal and offenders may be charged for fly-tipping if caught. River dumping not only causes water pollution; it also harms wildlife and increases the risk of flooding. Fly-tipping (this includes river dumping) is a criminal offence. In the most severe cases, it can attract a maximum fine of £50,000 or a 5 year jail term.

Marine Dumping

The Worldwide Fund for Nature (WWF) estimates that a staggering amount of waste enters into the sea every year. Part of this is due to deliberate dumping of waste into coastal waters. Other sources of waste at sea include plastics and other materials blown or washed from land. Marine dumping is illegal under international and UK legislation. For more information visit the [Marine Pollution](#) page.

Control of water pollution

Municipal wastewater treatment

In urban areas of developed countries, municipal wastewater (or sewage) is typically treated by centralized sewage treatment plants. Well-designed and operated systems (i.e., with secondary treatment steps or more advanced

treatment) can remove 90 percent or more of the pollutant load in sewage. Some plants have additional systems to remove nutrients and pathogens, but these more advanced treatment steps get progressively more expensive.

Nature-based solutions are also being used instead of (or in combination with) centralized treatment plants.

Cities with sanitary sewer overflows or combined sewer overflows employ one or more engineering approaches to reduce discharges of untreated sewage, including:

- utilizing a green infrastructure approach to improve storm water management capacity throughout the system, and reduce the hydraulic overloading of the treatment plant
- repair and replacement of leaking and malfunctioning equipment
- increasing overall hydraulic capacity of the sewage collection system (often a very expensive option).

On-site sanitation and safely managed sanitation

Households or businesses not served by a municipal treatment plant may have an individual septic tank, which pre-treats the wastewater on site and infiltrates it into the soil. This can lead to groundwater pollution if not properly done.

Industrial wastewater treatment

Some industrial facilities generate wastewater that is similar to domestic sewage and can be treated by sewage treatment plants. Industries that generate wastewater with high concentrations of organic matter (e.g. oil and grease), toxic pollutants (e.g. heavy metals, volatile organic compounds) or nutrients such as ammonia, need specialized treatment systems. Some industries install a pre-treatment system to remove some pollutants (e.g., toxic compounds), and then discharge the partially treated wastewater to the municipal sewer system.

Agricultural wastewater treatment

Non point source controls

Sediment (loose soil) washed off fields is the largest source of agricultural pollution in the United States. Farmers may utilize erosion controls to reduce runoff flows and retain soil on their fields. Common techniques include contour plowing, crop mulching, crop rotation, planting perennial crops and installing riparian buffers

Point source wastewater treatment

Farms with large livestock and poultry operations, such as factory farms, are called *concentrated animal feeding operations* or *feedlots* in the US and are being subject to increasing government regulation.

Soil Contamination: Its Causes, Effects, and Solutions

What is Soil Contamination?

Soil contamination refers to the destruction of land that could be used constructively by human activities, either directly or indirectly. Presently, 300,000 ha of UK land is thought to be contaminated by toxic elements such as lead and arsenic. The same goes for the other industrialized nations which are the worst hit. The developing countries are also steadily but surely moving toward this direction. This should be cause for great concern considering the devastating effects soil pollution brings to the environment.

Causes of Soil Contamination

Soil pollution is mostly caused by mindless human activities such as:

Industrial waste

Industries are by far the worst polluters of the soil with all the chemicals they release into the environment be it in liquid or solid form.

Deforestation

Clearing of trees leaves soil exposed to the elements so they are easily carried away by soil erosion. This leaves land barren and incapable of supporting vegetation.

Excessive use of fertilisers and pesticides

The increased demand for food has forced farmers to use fertilisers and pesticides that release nothing but toxins into the soil, killing useful microorganisms that are important in plant growth.

Garbage pollution

Garbage that cannot be recycled is disposed of carelessly and this is not only an eyesore but pollutes the land. Some of this waste can literally take thousands of years to decompose!

Effects of Soil Contamination

Climate change

Deforestation causes a change in the rain cycle and this is a contributing factor to global warming and loss of ecosystems.

Loss of soil fertility

With the rapid growth of human population, we need all the food we can get. Chemicals used on soils reduce soil fertility so food production drops.

Impact on human health

Countless deaths have been caused by human beings ingesting foods that are grown in toxic soils.

How to Reduce Soil Contamination

Reforestation

Most countries have policies that require its citizens to plant more trees where one has been cut. This is an effective measure to curb soil erosion. Governments should also take punitive action against those who cut down trees without a care in the world.

Controlled farming practices

Too much of anything is dangerous. The same concept applies to farming practices in that they should be carried out in moderation. Practices such as overcropping and overgrazing should be avoided since they increase soil erosion.

Bioremediation

This is the introduction of microorganisms into the soil that break down contaminants. This is a perfectly environmental friendly approach since it allows nature to take its course thus restoring balance.

Reduce, Recycle, and Reuse

Items that can be used again should not be disposed of; things made of paper, glass, aluminum and the like should be recycled; lastly, where excesses such as the use of polythene paper can be avoided, then, by all means, reduce their use.

Use biodegradable products

Where possible, opt to use biodegradable products such as cartons for packaging; if they were to be disposed of, they would easily be broken down to become part of the soil.

Reduce the use of pesticides and fertilisers

Pesticides and fertilisers are major contributors to soil contamination so cutting down on their usage could do a world of good to the soil.

We have one earth and if we completely destroy its surface, we will be the first to starve or poison ourselves. Redeeming land to its original state is nearly an impossible task. It'll require altering its properties which can be avoided if only we put our land into its proper and responsible use.

Causes of Marine Pollution

The marine environment becomes polluted and contaminated through various sources and forms. Major sources of marine pollution are the inflow of chemicals, solid waste, discharge of radioactive elements, industrial and agricultural effluents, man-made sedimentation, oil spills, and many such factors. The majority portion of the marine pollution comes from the land that contributes to 80 percent of the marine pollution, air pollution also carries pesticides from farms and dust into the marine waters. Air and land pollution is a major contributor to the growing marine pollution that is not only hampering the aquatic ecology but also affecting the life on land. The non-point sources like wind-blown debris, agricultural runoff, and dust become the major source of pollution. Apart from these, factors like land runoff, direct discharge, atmospheric pollution, pollution caused by ships, and deep sea mining of natural resources contribute heavily.

Types of Marine Pollution

Eutrophication

When there is an excess of chemical nutrients mainly nitrates and phosphates in the water, it leads to eutrophication or nutrient pollution. Eutrophication decreases the level of oxygen, reduces the quality of water, makes the water inhabitable for fish, affects the breeding process within the marine life and increases the primary productivity of the marine ecosystem.

Acidification

Oceans act as a natural reservoir for absorbing the carbon dioxide from the Earth's atmosphere. But, due to rising level of carbon dioxide in the atmosphere, the oceans across the world are becoming acidic in nature, as a consequence, it leads to acidification of oceans. Researches and scientists have not been able to uncover the potential damage ocean acidification may have on the Earth's atmosphere. But, there is a strong concern that acidification might lead to dissolution of calcium carbonate structures, that can affect the shell formation in shellfish and also the corals.

Toxins

There are persistent toxins that do not get dissolved or disintegrate with the marine ecosystem rapidly. Toxins such as pesticides, DDT, PCBs, furans, TBT, radioactive waste, phenols, and dioxins get accumulated in the tissue cells of the marine lifeforms and lead to bioaccumulation hampering the life underwater and sometimes leads to a mutation in aquatic life forms.

Plastics

The ever-growing dependence of human population on plastic has filled the oceans and the land, it consists of 80 percent of the debris found in the oceans. Plastic dumped and found in the oceans are dangerous for the marine life forms and wildlife, as sometimes it strangles and chokes them to death. The rising levels of plastic dumps found in the oceans are suffocating, ingesting, and entangling the life underwater as well as above it.

Effects of Marine Pollution

The contamination of water by excessive nutrients is known as nutrient pollution, a type of water pollution that affects the life under water. When excess nutrients like nitrates or phosphates get dissolved with the water it causes the eutrophication of surface waters, as it stimulates the growth of algae due to excess nutrients. Most of Benthic animals and plankton are either filter feeders or deposit feeders take up the tiny particles that adhere to potentially toxic chemicals. In the ocean food chains, such toxins get concentrated upward. This makes estuaries anoxic as many particles combine chemically depletive of oxygen.

When the marine ecosystem absorbs the pesticides, they are incorporated into the food webs of the marine ecosystem. After getting dissolved in the marine food webs, these harmful pesticides causes mutations, and also results in diseases, which can damage the entire food web and cause harm to the humans. When toxic metals are dumped or flown into the oceans through drains, it engulfs within the marine food webs. It affects the biochemistry, reproduction process, can affect the tissue matter These can cause a change to

tissue matter, biochemistry, behavior, reproduction, and suppress and alter the marine life's growth. Marine toxins can be transferred to several animals feeding on the fish or fish hydrolysate as a meal, toxins are then transferred to dairy products and meat of these affected land animals.

Steps to Prevent Marine Pollution

Stop using plastic and littering garbage as they not only choke up the drains but also releases into the oceans.

Ensure that chemicals mentioned above are not used anywhere near the streams of water and try cutting down on the usage of such chemicals.

For farmers, they need to switch from chemical fertilizers and pesticides and move towards the usage of organic farming methods.

Use public transport and reduce the carbon footprint by taking small and substantial measures that will not help in reducing the pollution from the environment but will ensure a safe and healthy future for the upcoming generations.

Prevent from any oil or chemical spill in the oceans and if in case there is an oil or chemical spill near you volunteer and help in cleaning out the ocean water.

Volunteer or initiate beach clean up activities and spread awareness about the same in the nearby vicinity.

What is Noise Pollution?

Most of us are very used to the sounds we hear in everyday life. Loud music, the television, people talking on their phone, the traffic and even pets barking in the middle of the night. All of these have become a part of the urban culture and rarely disturb us. However, when the sound of

the television keeps you from sleeping all night or the traffic starts to give you a headache, it stops becoming just noise and starts turning into noise pollution. For many of us, the concept of [pollution](#) is limited to nature and resources. However, noise that tends to disrupt the natural rhythm of life makes for one solid pollutant.

By definition, [noise pollution](#) takes place when there is either an excessive amount of noise or an unpleasant sound that causes a temporary disruption in the natural balance. This definition is usually applicable to sounds or noises that are unnatural in either their volume or their production. Our environment is such that it has become difficult to escape the noise. Even electrical appliances at home have a constant hum or beeping sound. By and large, lack of urban planning increases the exposure to unwanted sounds. This is why understanding noise [pollution](#) is necessary to curb it in time.

Various Causes of Noise Pollution

1. Industrialization

Most of the industries use big machines which are capable of producing a large amount of noise. Apart from that, various equipment like compressors, generators, exhaust fans, grinding mills also participates in producing big noise. Therefore, you must have seen workers in these

factories and industries wearing earplugs to minimize the effect of noise.

2. Poor Urban Planning

In most of the developing countries, poor urban planning also plays a vital role. Congested houses, large families sharing small space, fight over parking, frequent fights over basic amenities leads to noise [pollution](#) which may disrupt the environment of society.

3. Social Events

Noise is at its peak in most of the social events. Whether it is marriage, parties, pub, disc or place of worship, people normally flout rules set by the local administration and create nuisance in the area. People play songs on full volume and dance till midnight which makes the condition of people living nearby pretty worse. In markets, you can see people selling clothes via making a loud noise to attract the attention of people.

4. Transportation

A large number of vehicles on roads, airplanes flying over houses, underground trains produce heavy noise and people get it difficult to get accustomed to that. The high noise leads to a situation wherein a normal person loses the ability to hear properly.

5. Construction Activities

Under construction activities like mining, construction of bridges, dams, buildings, stations, roads, flyovers takes place in almost every part of the world. These construction activities take place every day as we need more buildings, bridges to accommodate more people and to reduce traffic congestion. The down point is that these construction equipment are too noisy.

6. Household Chores

We people are surrounded by gadgets and use them extensively in our daily life. Gadgets like TV, mobile, mixer grinder, pressure cooker, vacuum cleaners, washing machine and dryer, cooler, air conditioners are minor contributors to the amount of noise that is produced but it affects the quality of life of your neighborhood in a bad way.

While this form of pollution may seem harmless, it, in fact, has far-reaching consequences. The adverse effects on the [health of the environment](#) are quite severe. Not only is the local [wildlife affected by pollution](#) but humans also face a number of problems due to it.

Effects of Noise Pollution

1. Hearing Problems

Any unwanted sound that our ears have not been built to filter can cause problems within the body. Our ears can take in a certain range of sounds without getting damaged. Man-made noises such as jackhammers, horns, machinery, airplanes and even vehicles can be too loud for our hearing range. Constant exposure to loud levels of noise can easily result in the damage of our eardrums and loss of hearing. It also reduces our sensitivity to sounds that our ears pick up unconsciously to regulate our body's rhythm.

2. Health Issues

Excessive noise pollution in working areas such as offices, construction sites, bars and even in our homes can influence psychological health. Studies show that the occurrence of aggressive behavior, disturbance of sleep, constant stress, fatigue, and hypertension can be linked to excessive noise levels. These, in turn, can cause more severe and chronic health issues later in life.

3. Sleeping Disorders

Loud noise can certainly hamper your sleeping pattern and may lead to irritation and uncomfortable situations. Without a good night sleep, it may lead to problems related to fatigue and your performance may go down in the office as well as at home. It is therefore recommended to take a sound sleep to give your body proper rest.

4. Cardiovascular Issues

Blood pressure levels, cardiovascular disease, and stress-related heart problems are on the rise. Studies suggest that high-intensity noise causes high blood pressure and increases heartbeat rate as it disrupts the normal blood flow. Bringing them to a manageable level depends on our understanding of noise pollution and how we tackle it.

5. Trouble Communicating

High decibel noise can put trouble and may not allow two people to communicate freely. This may lead to misunderstanding and you may get difficult understanding the other person. Constant sharp noise can give you a severe headache and disturb your emotional balance.

6. Effect on Wildlife

Wildlife faces far more problems than humans because of noise pollution since they are more dependent on sound. Animals develop a better sense of hearing than us since their survival depends on it. The ill effects of excessive noise begin at home. Pets react more aggressively in households where there is a constant noise.

Thermal Pollution: Source, its harmful effects and preventive measures

Thermal pollution is the degradation of water quality by any process that changes ambient water temperature. A common cause of thermal

pollution is the use of water as a coolant by power plants and industrial manufacturers.

What is Thermal Pollution?

The term thermal pollution has been used to indicate the detrimental effects of heated effluent discharge by various power plants. It denotes the impairment of quality and deterioration of aquatic and terrestrial environment by various industrial plants like thermal, atomic, nuclear, coal-fired plants, oil field generators, factories, and mills.

What are the sources of Thermal Pollution?

1. Nuclear Power Plant
2. Coal-fired power Plant
3. Industrial Effluents
4. Domestic Sewage
5. Hydro-electric power
6. Thermal Power Plant

What are the harmful Effects of the Thermal Pollution?

The harmful effects of the thermal pollution are discussed below:

1. Reduction in dissolved Oxygen

The pollutant from various industrial plants are heated decreases the concentration of oxygen with an increase in the temperature of water.

2. Change in water properties

The decrease in density, viscosity and solubility of gases in water increases the setting speed of suspended particles which seriously affect the food supplies of aquatic organism.

3. Increase in toxicity

The concentrated pollutant causes the rise in the temperature of water which increases the toxicity of the poison present in water. The toxicity in water will increase the death rate in marine life.

4. Disruption of Biological activities

Temperature changes disrupt the entire marine ecosystem because changes in temperature causes change in physiology, metabolism and biological process like respiration rate, digestion, excretion and development of an aquatic organism.

How biochemical cycles stabilises the biosphere?

5. Damage of biotic organism

Aquatic organisms like juvenile fish, plankton, fish, eggs, larva, algae and protozoa which pass through screens and condenser cooling system are extremely sensitive to abrupt temperature changes. They are habitual of warmer water may suddenly face increase or decrease in temperature of water bodies and thus die because of sudden changes in the temperature of water.

How can thermal pollution be prevented?

The following measures can be taken to prevent or control high temperature caused by thermal pollution:

1. Heated water from the industries can treated before discharging directly to the water bodies.
2. Heated water from the industries can be treated by the installation of cooling ponds and cooling towers.
3. Industrial treated water can be recycled for domestic use or industrial heating.
4. Through artificial lakes: In this lake Industries can discharge their used or heated water at one end and water for cooling purposes may be withdrawn from the other end. The heat is eventually dissipated through evaporation.

Radioactive Pollution: Causes, Effects and Solutions

[Radioactive pollution](#) occurs when there is presence or depositions of radioactive materials in the atmosphere or environment, especially where their presence is accidental and when it presents an [environmental threat](#) due to radioactive decay. The destruction caused by the radioactive materials is because of the emissions of hazardous ionizing radiation (radioactive decay) like beta or alpha particles, gamma rays or neutrons in the environment where they exist.

Causes of Radioactive Pollution

1. Nuclear accidents from nuclear energy generation plants

In the postmodern world, various forms of energy are being discovered. Among them is nuclear energy, which is touted to be the most potent source of energy due to its high latent power. Reports indicate that the high latent power is due to its high level of radiation.

Its use is, therefore, prohibited but research is underway to determine its [environmental safety](#) and to put in place the most appropriate precautionary measures for its use. In some cases and countries, however, nuclear power plant accidents like the Fukushima Daiichi nuclear disaster, Chernobyl disaster, and Three Mile Island accident that left many dead and even many more affected by the radiation released.

2. The use of nuclear weapons as weapons of mass destruction (WMD)

The use of nuclear missiles and atomic bombs, a form of nuclear energy, in the Second World War not only explains cause but also the damaging nature of radioactive pollution or contamination. The effects of those two strikes in Hiroshima and Nagasaki that prompted the end of the war in 1945 have been seen to date with children born with complications such mental retardation as well as conditions such as autism and other disorders. The number of cancer cases present in the two towns is more than those of the rest of [Japan](#).

3. Use of radio isotopes

Radio isotopes are used to make detectors and in other industrial activities. Isotopes such as uranium have high concentrations of radiation in them. On the other hand, common Isotopes such as carbon

containing radioactive material are easily found in water ways through sewage lines.

Since most of the raw sewage is untreated before release, once released, the isotope combines with other compounds and elements in water. This is the same water that people fetch for domestic use. Moreover, fishes use the same water to survive. Consumption of these fish and from contaminated water sources means potential intake of radiation.

4. Mining

Mining mostly involves the excavation of the mineral ores which are then broken into smaller manageable pieces. Radium and Uranium, for instance, are naturally occurring in the environment and are equally radioactive. Hence, mining increases the natural geological processes by moving these materials from underneath the earth to the surface. Other minerals with a hint of radiation are thorium, plutonium, radon, potassium, carbon and phosphorus.

5. Spillage of radioactive chemicals

There have been instances of spillages over oceans when ships hit glaciers or [coral reefs](#) and end up releasing chemicals on waterways and in the atmosphere. The majority of these chemicals including

petroleum products have a significant level of radiation which can be detrimental to the environment.

6. Tests on radiation

Radiation has been seen to have a lot of interesting properties which has promoted a lot of scientists to conduct tests to learn more about it. It is one of the key elements in the cure and treatment of cancer.

Chemotherapy, a cancer curative health initiative uses radiation to prevent further growth of the cancer cells as well as keep the immune system strong. Despite this, scientists have been exposed to radiation leading to their deaths or to complications.

7. Cosmic rays

These come from outer space to our planet with intense radiation as their nature, therefore, causing radioactive pollution. Gamma rays, for example, are said to have the highest level of radiation and yet, depending on their intensity, some are not visible to the human eye. The quantity with which the rays hit the earth depends on the altitude of the earth and the geographical location.

Effects of Radioactive Pollution

1. Genetic mutations

Radiation has adverse effects when it comes to genetics. It leads to damage of DNA strands leading to genetic break up in the course of time. The degree of genetic mutation leading to changes in DNA composition vary due to the level of radiation one has been exposed to and the kind of exposure.

In the event that a human or an animal is exposed to too much radiation from the atmosphere, food consumed and even water used then chances are that their bodies have already absorbed the radiation. Once in the body, it remains active because energy cannot be destroyed.

The resulting mutation makes one highly susceptible to cancer. For pregnant women, kids born have adverse defects caused by genetic mutations like low weight during birth. Effects such as disfigured births and impairment like blindness in children have also been reported. Infertility has also been mentioned as an effect of radiation.

2. Diseases

Cancer is the most dominant radiation related disease. It has developed over the years and poses great risk in global health. Others include leukemia, anemia, hemorrhage, a reduction in the life span leading to premature aging and premature deaths as well as others

such as cardiovascular complications. Leukemia, for instance, is caused by radiation in the bone marrow.

3. Soil infertility

Exposure of radiation to the atmosphere means it is present even in soils. Radioactive substances in the soil react together with the various nutrients leading to destruction of those nutrients, thus rendering the soil infertile and **highly toxic**. Such soil leads to the harvest of crops that are riddled with radiation and thus, unfit for consumption by both humans and animals.

4. Cell destruction

Radioactive pollution has diverse effects such as the alteration of cells. The bodies of living organisms are unique in that there are millions of cells in one single body, where each has its purpose to fulfill. Radiation distorts the cells present leading to permanent damage of the various organs and organ systems. In the face of too much radiation, permanent illnesses and death are inevitable.

5. Burns

Radiation is not easy to feel but it is easy to realize that you have been affected by it. The immediate presence of burns, red lesions and sores is evidence. To make it worse, this can lead to skin cancer.

Solutions of Radioactive Pollution

1. Proper method of disposing radioactive waste

Radioactive waste still has some level of radiation. Accordingly, it cannot be disposed in the same way as normal waste. It cannot be incinerated or buried. Since there is likelihood of seepage, this waste should be stored in heavy and thick concrete containers. Another option is to dilute the radiation since storage may not be possible. Since there are no easy ways of disposing of radioactive material, professional assistance should always be sought.

2. Proper labeling

It is necessary for any material with radioactive content to be labeled and the necessary precautions advised on the content of the label. The reason for this is because radiation can enter the body by a mere touch of radioactive material. Containers with such elements should be well labeled in order for one to use protective gear when handling them.

3. Banning of nuclear tests

It has already been proven that nuclear power has a lot of latent power that is very destructive. Nevertheless, the tests done to perfect the energy contribute greatly to the overall presence of radioactive substances. Moreover, these tests though done in the deserts end up escaping from one [ecosystem](#) to another eventually affecting the lives of many people.

4. Alternative energy sources

The evolution and use of nuclear power was not a bad thing initially.

5. Proper storage

It is mandatory for containers carrying radioactive material to be stored properly. For starters, such substances should be stored in radiation proof containers to ensure no seeping or leakage during handling. Proper storage means no harm and can minimize cases of accidental leakage.

6. Reusing

Since it is not easy to store or dispose the waste, it can be recycled and used for other purposes like in another reactor as fuel thereby [protecting the environment](#).

Radioactive Pollution: Causes, Effects and Solutions

[Radioactive pollution](#) occurs when there is presence or depositions of radioactive materials in the atmosphere or environment, especially where their presence is accidental and when it presents an [environmental threat](#) due to radioactive decay. The destruction caused by the radioactive materials is because of the emissions of hazardous ionizing radiation (radioactive decay) like beta or alpha particles, gamma rays or neutrons in the environment where they exist.

Since the substances are characterized by radiation – because there is a lot of instability of the particles present in the radioactive materials, it can seriously affect, alter and even destroy plant, animal, and human life. The extent of damage or danger posed to the environment depends upon the radioactive material concentration, the energy

emitted by the radiation, proximity of the radioactive materials to those exposed, and the radiation type. **Herein is a detailed explanation of the causes, effects, and solutions of radioactive pollution.**

Causes of Radioactive Pollution

1. Nuclear accidents from nuclear energy generation plants

In the postmodern world, various forms of energy are being discovered. Among them is nuclear energy, which is touted to be the most potent source of energy due to its high latent power. Reports indicate that the high latent power is due to its high level of radiation.

Its use is, therefore, prohibited but research is underway to determine its [environmental safety](#) and to put in place the most appropriate precautionary measures for its use. In some cases and countries, however, nuclear power plant accidents like the Fukushima Daiichi nuclear disaster, Chernobyl disaster, and Three Mile Island accident that left many dead and even many more affected by the radiation released.

2. The use of nuclear weapons as weapons of mass destruction (WMD)

The use of nuclear missiles and atomic bombs, a form of nuclear energy, in the Second World War not only explains cause but also the damaging nature of radioactive pollution or contamination. The effects of those two strikes in Hiroshima and Nagasaki that prompted the end of the war in 1945 have been seen to date with children born with complications such mental retardation as well as conditions such as autism and other disorders. The number of cancer cases present in the two towns is more than those of the rest of [Japan](#).

3. Use of radio isotopes

Radio isotopes are used to make detectors and in other industrial activities. Isotopes such as uranium have high concentrations of radiation in them. On the other hand, common Isotopes such as carbon containing radioactive material are easily found in water ways through sewage lines.

Since most of the raw sewage is untreated before release, once released, the isotope combines with other compounds and elements in water. This is the same water that people fetch for domestic use. Moreover, fishes use the same water to survive. Consumption of these fish and from contaminated water sources means potential intake of radiation.

4. Mining

Mining mostly involves the excavation of the mineral ores which are then broken into smaller manageable pieces. Radium and Uranium, for instance, are naturally occurring in the environment and are equally radioactive. Hence, mining increases the natural geological processes by moving these materials from underneath the earth to the surface. Other minerals with a hint of radiation are thorium, plutonium, radon, potassium, carbon and phosphorus.

5. Spillage of radioactive chemicals

There have been instances of spillages over oceans when ships hit glaciers or [coral reefs](#) and end up releasing chemicals on waterways and in the atmosphere. The majority of these chemicals including petroleum products have a significant level of radiation which can be [detrimental to the environment](#).

6. Tests on radiation

Radiation has been seen to have a lot of interesting properties which has promoted a lot of scientists to conduct tests to learn more about it. It is one of the key elements in the cure and treatment of cancer.

Chemotherapy, a cancer curative health initiative uses radiation to prevent further growth of the cancer cells as well as keep the immune

system strong. Despite this, scientists have been exposed to radiation leading to their deaths or to complications.

7. Cosmic rays

These come from outer space to our planet with intense radiation as their nature, therefore, causing [radioactive pollution](#). Gamma rays, for example, are said to have the highest level of radiation and yet, depending on their intensity, some are not visible to the human eye. The quantity with which the rays hit the earth depends on the altitude of the earth and the geographical location.

Effects of Radioactive Pollution

1. Genetic mutations

Radiation has adverse effects when it comes to genetics. It leads to damage of DNA strands leading to genetic break up in the course of time. The degree of genetic mutation leading to changes in DNA composition vary due to the level of radiation one has been exposed to and the kind of exposure.

In the event that a human or an animal is exposed to too much radiation from the atmosphere, food consumed and even water used then chances are that their bodies have already absorbed the radiation.

Once in the body, it remains active because energy cannot be destroyed.

The resulting mutation makes one highly susceptible to cancer. For pregnant women, kids born have adverse defects caused by genetic mutations like low weight during birth. Effects such as disfigured births and impairment like blindness in children have also been reported. Infertility has also been mentioned as an effect of radiation.

2. Diseases

Cancer is the most dominant radiation related disease. It has developed over the years and poses great risk in global health. Others include leukemia, anemia, hemorrhage, a reduction in the life span leading to premature aging and premature deaths as well as others such as cardiovascular complications. Leukemia, for instance, is caused by radiation in the bone marrow.

3. Soil infertility

Exposure of radiation to the atmosphere means it is present even in soils. Radioactive substances in the soil react together with the various nutrients leading to destruction of those nutrients, thus rendering the soil infertile and **highly toxic**. Such soil leads to the harvest of crops that are riddled with radiation and thus, unfit for consumption by both humans and animals.

Plants that grow from such soil are also genetically modified. Since these are at the base of the food chain, the herbivores consume them and retain the radiation levels. The carnivores such as lions, vultures end up consuming them and increasing their levels of radiation – explained through the concept of [Biomagnification](#).

•

4. Cell destruction

[Radioactive pollution](#) has diverse effects such as the alteration of cells. The bodies of living organisms are unique in that there are millions of cells in one single body, where each has its purpose to fulfill. Radiation distorts the cells present leading to permanent damage of the various organs and organ systems. In the face of too much radiation, permanent illnesses and death are inevitable.

5. Burns

Radiation is not easy to feel but it is easy to realize that you have been affected by it. The immediate presence of burns, red lesions and sores is evidence. To make it worse, this can lead to skin cancer.

Solutions of Radioactive Pollution

1. Proper method of disposing radioactive waste

Radioactive waste still has some level of radiation. Accordingly, it cannot be disposed in the same way as normal waste. It cannot be incinerated or buried. Since there is likelihood of seepage, this waste should be stored in heavy and thick concrete containers. Another option is to dilute the radiation since storage may not be possible. Since there are no easy ways of disposing of radioactive material, professional assistance should always be sought.

2. Proper labeling

It is necessary for any material with radioactive content to be labeled and the necessary precautions advised on the content of the label. The reason for this is because radiation can enter the body by a mere touch of radioactive material. Containers with such elements should be well labeled in order for one to use protective gear when handling them.

3. Banning of nuclear tests

It has already been proven that nuclear power has a lot of latent power that is very destructive. Nevertheless, the tests done to perfect the energy contribute greatly to the overall presence of radioactive substances. Moreover, these tests though done in the deserts end up

escaping from one [ecosystem](#) to another eventually affecting the lives of many people.

4. Alternative energy sources

The evolution and use of nuclear power was not a bad thing initially. However, considering the [damage and threats it has on the environment](#), it is high time for its use to be discontinued and for the world to perhaps focus on alternative and environmentally friendly energy sources – like renewable sources of energy namely Solar, hydro-electric and wind power.

The use of radioactivity to generate energy in nuclear power plants, for example, leads to the production of more radiation to the atmosphere considering the waste released from the various processes and combustion.

5. Proper storage

It is mandatory for containers carrying radioactive material to be stored properly. For starters, such substances should be stored in radiation proof containers to ensure no seeping or leakage during handling. Proper storage means no harm and can minimize cases of accidental leakage.

6. Reusing

Since it is not easy to store or dispose the waste, it can be recycled and used for other purposes like in another reactor as fuel thereby **protecting the environment**.

ROLE OF AN INDIVIDUAL IN PREVENTION OF POLLUTION

Environment protection has been burning issue in last half century. In order to tackle the menace of pollution, urgent steps have to be taken at not only global or country level, but also at local level. In fact, the role of individuals in prevention of pollution is of critical importance, because it is the individuals that make a community or country. Effort by each individual at his or her level can have a significant effect on global level. It has been aptly said “charity begins at home”.

Aware and inspired individuals are strongest tool to tackle pollution. This is because an aware individual not only lessens the burden on state but also he/she can tackle problem of pollution more effectively as he/she is more familiar with problems persisting at local level and he himself/herself deals with them in his/her day to day life. It is better and more viable to prevent pollution by educating individuals than controlling

pollution. Individuals should encourage to modify their lifestyle and living habits if that are not healthy for environment.

- Individuals should minimize wastage of resources such as electricity. Every unit of electricity saved is equivalent unit of electricity produced as it not only saves the fuel that would be used to produce that electricity, but also help to prevent pollution that is accompanied by burning of that fuel. Therefore, person should always switch off appliances when not in use.
- Individuals should prefer walking or use cycles instead of using motor vehicles, especially when distances to be travelled are small.
- Individuals can make considerable contribution by using mass transport (buses, trains, etc) instead of using personal vehicles.
- When going to workplace, colleagues from nearby localities should pool vehicles instead of going in individual personal vehicles.
- Taking personal vehicles for periodic pollution checks at centres approved by authorities.
- Individuals should reuse items whenever possible.
- Products that are made of recycled material should be given preference.
- Use gunny bags made of jute instead of plastic bags.
- Take part in environment conservation drives such as tree planting drives.
- Use water resources efficiently.
- Use renewable resources by installing equipment such as solar heaters and using solar cookers.
- Dispose potentially harmful products such as cells, batteries, pesticide containers, etc properly.
- Use of refrigerators should be minimised wherever possible as they are main source of CFC, which is responsible for Ozone layer depletion.
- Follow and promote family planning, as more population means more resources utilized and more resources utilized imply more pollution.
- Avoid making noise producing activities such as listening to loud music.
- Use handkerchiefs instead of paper tissues.
- Organize drives to clean streets and clean drains with help of other people of locality.
- Spread awareness and inspire other people to prevent pollution. Individuals should be encouraged to acquire information and innovations from world over and implement them locally.

Disaster management

Disaster management in India refers to the conservation of lives and property during natural or man-made disasters. Disaster management plans are multi-layered and are planned to address issues such as floods, hurricanes, fires, mass failure of utilities, rapid spread of disease and droughts. India is especially vulnerable to natural disasters because of its unique geo-climatic condition, having recurrent floods, droughts, cyclones, earthquakes, and landslides. As India is a very large country, different regions are vulnerable to different natural disasters. For example, during rainy season the peninsular regions of South India is mostly affected by cyclones and states of West India experience severe drought during summer.

Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.

Earthquake mitigation strategies:

- a. Existing critical facilities built on reclaimed land should be inspected and retrofitted if necessary to ensure earthquake resistance.
- b. Future critical facilities should not be located on reclaimed land because of the high potential for liquefaction.
- c. Older unreinforced masonry buildings should be inspected and retrofitted if necessary to increase earthquake resistance.

d. Older unreinforced masonry buildings should not be used for critical functions.

Cyclone mitigation strategies:

a. Future critical facilities should not be located in areas of accelerated winds.

b. The most significant aspect of structural damage to buildings by high velocity wind results from roof damage. The roofs of existing buildings should be inspected and if necessary retrofitted to adequate standards.

c. The roofs of existing critical facilities should be retrofitted to a higher standard to ensure wind resistance.

d. Building openings such as windows and doors also suffer damage from high velocity winds. These openings if not constructed of wood or metal should be protected with shutters or temporary covers of adequate design.

Volcanic disasters mitigation strategies:

a. Learn about community warning systems and of disasters that can come from volcanoes (earthquakes, flooding, landslides, mudflows, thunderstorms, tsunamis)

b. Make evacuation plans to higher ground with a backup route.

Flood mitigation strategies:

- a. Watercourses which pass through significant settlement areas should be properly configured and lined with concrete.
- b. Existing bridges should be inspected to determine which ones are too low or which have support pillars within the watercourse channel. Where possible these should be replaced as these features restrict water flow and cause the channels to be easily blocked with debris.
- c. Future bridges should not be built with these undesirable features.
- d. Buildings constructed adjacent to watercourses should be elevated by at least one meter to prevent potential flood inundation.
- e. Critical facilities should not be located adjacent to watercourses.

Urban Problems Related to Energy

Urban center use enormous quantities of energy. In the past, urban housing required relatively smaller amounts of energy than we use at present. Traditional housing in India required very little temperature adjustments as the material used, such

as wood and bricks, handled temperature changes better than the current concrete, glass and steel of ultra-modern building.

There are several hurdles that play havoc in energy conservation. They are:

- (i) Lack of awareness
- (ii) Attitude
- (iii) Lack of technical knowledge
- (iv) Market distortion
- (v) Capital shortages.

Water conservation

Water conservation day is celebrated on 22nd of March. Water conservation includes all the policies, strategies and activities to sustainably manage the natural resource of fresh water, to protect the hydrosphere, and to meet the current and future human demand. Population, household size and growth and affluence all affect how much water is used. Factors such as climate change have increased pressures on natural water resources especially in manufacturing and agricultural irrigation. Many countries have already implemented policies aimed at water conservation, with much success.

The goals of water conservation efforts include:

- **Ensuring the availability of water for future generations where the withdrawal of freshwater from an ecosystem does not exceed its natural replacement rate.**
- **Energy conservation as water pumping, delivery and wastewater treatment facilities consume a significant amount of energy. In some**

regions of the world over 15% of total electricity consumption is devoted to water management.

- **Habitat conservation where minimizing human water use helps to preserve freshwater habitats for local wildlife and migrating waterfowl, but also water quality. The water that leaks from aquagaurd should be collected and could be used for household works.**

Rainwater harvesting

Rainwater harvesting is a type of harvest in which the rain drops are collected and stored for the future use, rather than allowing them to run off. Rainwater can be collected from rivers or roofs and redirected to a deep pit (well, shaft, or borehole), aquifer, a reservoir with percolation, or collected from dew or fog with nets or other tools. Its uses include water for gardens, livestock, irrigation, domestic use with proper treatment, indoor heating for houses, etc. The harvested water can also be used as drinking water, longer-term storage, and for other purposes such as groundwater recharge.

Rainwater harvesting is one of the simplest and oldest methods of self-supply of water for households usually financed by the user.

Methods of Rainwater Harvesting

1. Surface Runoff Harvesting

In urban areas, rainwater flows away as surface runoff. This runoff can be caught and used for recharging aquifers by adopting appropriate methods.

2. Rooftop Rainwater Harvesting

It is a system of catching rainwater where it falls. In rooftop harvesting, the roof becomes the catchment, and the rainwater is collected from the roof of the house/building.

Watershed management

Watershed management is the study of the relevant characteristics of a [watershed](#) aimed at the [sustainable distribution](#) of its resources and the process of creating and implementing plans, programs and projects to sustain and enhance [watershed](#) functions that affect the [plant](#), [animal](#), and [human](#) communities within the watershed boundary. Features of a watershed that agencies seek to manage to include [water supply](#), [water](#)

[quality](#), [drainage](#), [stormwater runoff](#), [water rights](#) and the overall planning and utilization of watersheds. [Landowners](#), [land use](#) agencies, stormwater management experts, environmental specialists, water use surveyors and communities all play an integral part in watershed management.

What are Environmental Ethics?

Environmental ethics is a branch of ethics that studies the relation of human beings and the environment and how ethics play a role in this. Environmental ethics believe that humans are a part of society as well as other living creatures, which includes plants and animals. These items are a very important part of the world and are considered to be a functional part of human life. Thus, it is essential that every human being respect and honor this and use morals and ethics when dealing with these creatures.

As per Nature.com, "*Environmental ethics is a branch of applied philosophy that studies the conceptual foundations of environmental values as well as more concrete issues surrounding societal attitudes, actions, and policies to protect and sustain biodiversity and ecological systems.*"

According to Wikipedia, "*Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large range of disciplines including environmental law,*

environmental sociology, ecotheology, ecological economics, ecology and environmental geography."

What is global warming?

Global warming is a phenomenon of climate change characterized by a general increase in average temperatures of the Earth, which modifies the weather balances and ecosystems for a long time. It is directly linked to the increase of greenhouse gases in our atmosphere, worsening the greenhouse effect.

Global warming causes

FOSSIL FUELS

The massive use of fossil fuels is obviously the first source of global warming, as burning coal, oil and gas produces carbon dioxide - the most important greenhouse gas in the atmosphere - as well as nitrous oxide.

DEFORESTATION

The exploitation of forests has a major role in climate change. Trees help regulate the climate by absorbing CO₂ from the atmosphere. When they are cut down, this positive effect is lost and the carbon stored in the trees is released into the atmosphere.

INTENSIVE FARMING

Another cause of global warming is intensive farming, not only with the ever-increasing livestock, but also with plant protection products and fertilizers. In fact, cattle and sheep produce large amounts of methane when digesting their food, while fertilizers produce nitrous oxide emissions.

WASTE DISPOSAL

Waste management methods like landfills and incineration emit greenhouse and toxic gases - including methane - that are released into the atmosphere, soil and waterways, contributing to the increase of the greenhouse effect.

MINING

Modern life is highly dependent on the mining and metallurgical industry. Metals and minerals are the raw materials used in the construction, transportation and manufacturing of goods. From extraction to delivery, this market accounts for 5% of all greenhouse gas emissions.

OVERCONSUMPTION

Finally, overconsumption also plays a major role in climate change. In fact, it is responsible for the overexploitation of natural resources and emissions from international freight transport, which both contribute to global warming.

Global warming effects

Here are some consequences that are documented in the Intergovernmental Panel on Climate Change Special Report on Global Warming:

1. On biodiversity

The increase of temperatures and the climate upheavals disturb the ecosystems, modify the conditions and cycles of plant reproduction. The scarcity of resources and climate change are changing life habits and migratory cycles of animals. We are already witnessing the disappearance of many species - including endemic species - or, conversely, the intrusion of invasive species that threaten crops and other animals.

2. On oceans

Because of global warming, permafrost and ice are melting massively at the poles, increasing the sea level at a rate never known before. In a century, the increase reached 18 cm (including 6 cm in the last 20 years). The worst case scenario is a rise of up to 1m by 2100.

3. On humans

Human beings are not spared by these upheavals. Climate change is affecting the global economy. It is already shaking up social, health and geopolitical balances in many parts of the world. The scarcity of resources like food and energy gives rise to new conflicts.

4. On the weather

For decades now, meteorologists and climatologists around the world have been watching the effects of global warming on the weather phenomena. And the impact is huge: more droughts and heatwaves, more precipitations, more natural disasters like floods, hurricanes, storms and wildfires, frost-free season, etc.

Global warming prevention

Good news - there are ways to reduce global warming. But how to react to climate change? What solutions to consider?

1. Renewable energies

The first way to prevent climate change is to move away from fossil fuels. What are the alternatives? Renewable energies like solar, wind, biomass and geothermal.

2. Energy & water efficiency

Producing clean energy is essential, but reducing our consumption of energy and water by using more efficient devices (e.g. LED light bulbs, innovative shower systems) is less costly and equally important.

3. Sustainable transportation

Promoting public transportation, carpooling, but also electric and **hydrogen mobility**, can definitely help reduce CO₂ emissions and thus fight global warming.

4. Sustainable infrastructure

In order to reduce the CO₂ emissions from buildings - caused by heating, air conditioning, hot water or lighting - it is necessary both to build new low energy buildings, and to renovate the existing constructions.

Acid rain

Acid rain is a rain or any other form of precipitation that is unusually acidic, meaning that it has elevated levels of hydrogen ions (low pH). It can have harmful effects on plants, aquatic animals and infrastructure. Acid rain is caused by emissions of sulfur dioxide and nitrogen oxide, which react with the water molecules in the atmosphere to produce acids. Some governments have made

efforts since the 1970s to reduce the release of sulfur dioxide and nitrogen oxide into the atmosphere with positive results. Nitrogen oxides can also be produced naturally by lightning strikes, and sulfur dioxide is produced by volcanic eruptions. Acid rain has been shown to have adverse impacts on forests, freshwaters and soils, killing insect and aquatic life-forms, causing paint to peel, corrosion of steel structures such as bridges, and weathering of stone buildings and statues as well as having impacts on human health.

Depletion of Ozone Layer

Ozone depletion consists of two related events observed since the late 1970s: a steady lowering of about four percent in the total amount of ozone in Earth's atmosphere (the ozone layer), and a much larger springtime decrease in stratospheric ozone around Earth's polar regions. The latter phenomenon is referred to as the **ozone hole**. There are also springtime polar tropospheric ozone depletion events in addition to these stratospheric events.

The main cause of ozone depletion and the ozone hole is manufactured chemicals, especially manufactured halocarbon refrigerants, solvents, propellants and foam-blowing agents (chlorofluorocarbons (CFCs), HCFCs, halons), referred to as **ozone-depleting substances (ODS)**. These compounds are transported into the stratosphere by turbulent mixing after being emitted from the surface, mixing much faster than the molecules can settle

Population growth and variation among nations

VARIATION OF POPULATION AMONG NATIONS Different regions of the world find themselves at different stages of : **demographic** Their transition from high to low mortality and fertility. **growth** path also differ considerably, resulting in significant shifts in the geographical distribution of the world's **population**.

POPULATION EXPLOSION FAMILY WELFARE PROGRAM

In response to our phenomenal **population growth**, India seriously took up an effective **Family Planning Program** which was renamed the **Family Welfare Program**. Slogans and awareness-building **programmes** have disseminated the ideal that each **family** should not have more than two children.

Values education

Value education is the process by which people give moral values to each other. According to Powney et al. It can be an activity that can take place in *any* human organisation during which people are assisted by others, who may be older, in a condition experienced to make explicit our ethics in order to assess the effectiveness of these values and associated behaviour for their own and others' long term well-being, and to reflect on and acquire other values and behaviour which they recognise as being more effective for long term well-being of self and others.

Role of Information Technology in Environment and Human Health

When you talk about [information technology](#), it has a significant hand in improving the status in the fields of environmental education and human health as compared to that of the other respective areas such as business, economics, and culture or politics. The emerging growth of the internet services and facilities, geographic information system or GIS, and the data that gets transmitted through satellites, etc. have generated a higher affluence of the updated information on several aspects of the environment as well as health. When you look for the variety of software in the market, you will come across a number of them that created for the health and environment studies in a better way. They are quite user-friendly and certainly help a learner to understand the respective subject with ease.

The information of database can easily extract in a computer. When it comes to comprehensive databases, things that include in it are wildlife database, forest cover database, and conservation database, etc. the

databases are also available for some diseases which include malaria, fluorosis, HIV/AIDS, etc.

- National management information system (NMIS).
- Environmental information system (ENVIS).
- Remote sensing and geographical information system (GIS).
- Geographical information system (GIS).
- The World Wide Web (WWW).