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FACULTY OF ENGINEERING AND  
TECHNOLOGY

## Lecture- 23

# Environmental Pollution-Part 3



**Dr. Swati Sachdev,  
Assistant Professor,  
Dept. of Applied Sciences and Humanities**

**Subject : Environmental Studies and Disaster Management**

**Course: B.Sc. Ag. (1<sup>st</sup> year)**

**Subject Code: PPY-211**

**Semester: II<sup>nd</sup> sem.**

# Soil Pollution

Soil is a thin covering over the land consisting of a mixture of minerals, organic material, living organisms, air and water that together support the growth of plant life.

Alteration in the composition of soil that affects its ability to support plant growth is called **soil pollution**.

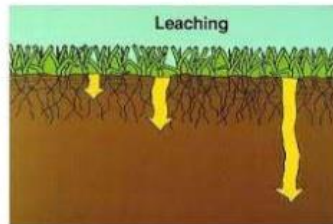


# Causes of soil pollution

- Soil erosion
- Dumping of Industrial waste
- Dumping sewage sludge
- Agricultural activities
- Animal waste
- Urban runoff
- Mining and smelting waste
- Radioactive waste
- Accidental spill
- Acid rain

## Pesticides and soil pollution

- Drain off
- Leaching
- Spillage
- Over dosage



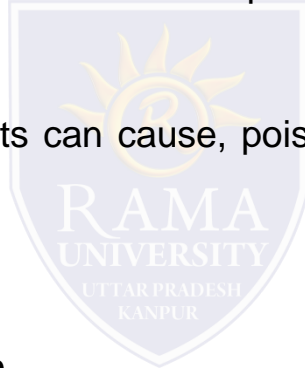
# Effects of soil pollution

Some major effects of soil pollution are listed below.

## **Effects on human health**

Crops and plants that are grown on polluted soil absorb pollutants and transfer to humans through food chain.

Long term exposure to such soil pollutants can cause, poisoning genetic problems and chronic health issues.



## **Effects on soil fertility and plant growth**

The toxic chemicals can decrease soil fertility, increase desertification and decrease plant productivity and quality.

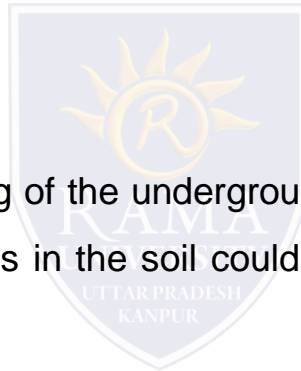
## **Pollute air**

The emission of toxic and foul gases from landfills pollutes the environment and causes serious effects on the health of people.

## **Contaminate ground water**

Soil pollution also leads to the poisoning of the underground water table. Since this water is stored beneath the layers of the soil, the toxins in the soil could easily percolate slowly and steadily into the water table.

When contaminated water is consumed over a period of time, it causes ill effects on human health.



# Preventive or control measures

**Reduced use of chemical fertilizers and pesticides:** Reduce load of toxins in soil

**Promote use of natural or biological fertilizers or pesticides:** Enhance soil fertility

**Reforestation and Afforestation:** It can prevent soil erosion

**Recycle and reuse products:** Minimize solid waste production



# Noise pollution

## Noise

'Noise' is any unwanted sound that disrupts environmental equilibrium.

Noise is measured in unit **decibels**. Dosimeter is a device used to measure noise.

## Noise pollution

It is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms.

According to the World Health Organization, sound levels less than 70 dB are not damaging to living organisms, regardless of how long or consistent the exposure is.

Exposure for more than 8 hours to constant noise beyond 85 dB may be hazardous.





# Sources and effects of noise pollution

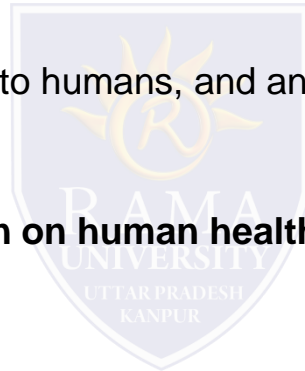
Major sources of 'noise pollution' are **motor vehicles, aircrafts, trains, fire-crackers, sirens, loud speakers, industrial machinery and engines, construction activities, televisions**, etc.

Poor urban planning may also give rise to noise pollution, since industrial and residential buildings constructed side-by-side can result in noise pollution in the residential areas.

Noise pollution is excessively displeasing to humans, and animals, and disrupts the activity or balance of human or animal life.

**Some adverse effects of noise pollution on human health are:**

- Hearing loss or hearing impairment;
- Rise in blood pressure;
- Cardio-vascular health effects;
- Increase in stress level;
- Decrease in efficiency and concentration;
- Sleep disturbance; and
- Psychological dysfunction



## Effects of Noise Pollution on Wildlife and Marine Life

Oil drills, sonars, seismic survey devices, coastal recreational watercraft and shipping vessels are serious cause of noise pollution for marine life.

Whales are among the most affected, as their hearing helps them orient themselves, feed and communicate.

Noise pollution thus interferes with cetaceans' (whales and dolphins) feeding habits, reproductive patterns and migration routes, and can even cause haemorrhage and death.

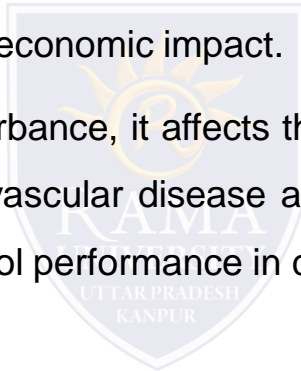
Other than marine life, land animals are also affected by noise pollution in the form of traffic, firecrackers etc., and birds are especially affected by the increased air traffic.

## **Social and Economic Costs of Noise Pollution**

The World Health Organization estimates that one out of three people in Europe is harmed by traffic noise.

Noise pollution has significant social and economic impact.

Since noise pollution leads to sleep disturbance, it affects the individual's work performance during the day, it leads to hypertension and cardiovascular disease and costs the health system additional time and money, and it negatively affects school performance in children.



# Control measures

**Noise pollution can be effectively controlled by taking the following measures:**

**1) Control at Receiver's End:** Use of ear-protection aids ear-protection aids like ear-plugs, ear-muffs, noise helmets, headphones etc. must be provided to reduce occupational exposure.

**2) Suppression of Noise at Source:**

- Designing, fabricating and using quieter machines to replace the noisy ones.
- Installing noisy machines in sound proof chambers.
- Reducing noise of machines by lubricating them, cover noise producing parts of machines with sound-absorbing materials, using silencer, glass wool for mechanical protection, etc.

**3) Acoustic Zoning:** Increased distance between source and receiver by zoning of noisy industrial areas, railway stations, etc. away from the residential areas.

#### **4) Sound Insulation at Construction Stages:**

- For reducing noise, the space left between wall and door (jamb frame gap) should be packed with sound absorbing material.
- Sound insulation can be done by constructing windows with double or triple panes of glass and filling the gaps with sound absorbing materials.
- Acoustical tiles, perforated plywood etc. can be fixed on walls, ceilings, floors etc. to reduce noise

**5) Planting of Trees:** Plants or trees help in noise reduction to a considerable extent.

#### **6) Legislative Measures:**

- Strict legislative measures need to be enforced to curb the noise pollution. Some of these measures could be:
- Minimum use of loudspeakers and amplifiers especially near silence zones.
- Banning pressure horns in automobiles.
- Framing a Noise Pollution Act.

# Nuclear hazards

- Radioactive materials used to produce energy and weapons, medical facilities, etc. are the potential source for creating the most important and dangerous types of pollution, known as 'nuclear/radioactive pollution'.
- However, when release of nuclear radiation from nuclear explosion, mishandling of radioactive materials, spillage of radioactive material, inappropriate disposal of radioactive materials, failure or accident in nuclear power plants is high enough to pose risk to human life and other living organisms give rise to nuclear hazards.
- Due to nuclear explosions about 15 to 25% of the radioactive particles enter into the atmosphere. Once they enter into the atmosphere they continue to fall on the earth for several years.
- The best example of nuclear hazard is the Hiroshima Atomic Bombings and Chernobyl nuclear power plant accident.



# Effects of nuclear hazards

The effects of radioactive materials can be initial or residual

Initial effects occur in the immediate area of explosion and are hazardous immediately after the explosion.

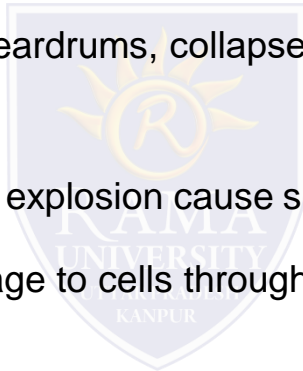
The principal initial effects include blast and radiation.

Blast causes damage to lungs, ruptures eardrums, collapse's structure and causes immediate death or injury.

Thermal Radiation occur through nuclear explosion cause skin burns, and flash blindness.

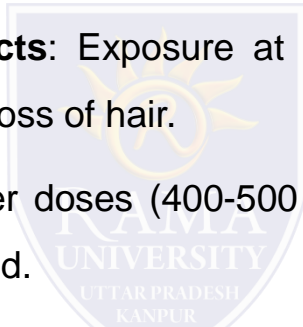
Nuclear radiation causes extensive damage to cells throughout the body and even death, depending on the radiation dose received.

The residual effects can last for days or years and may lead to death.



Some of the possible human health effects of radiation include:

- **Effects on DNA:** This affects the genetic make-up and can cause mutation. It also cause cancer, teratogenesis.
- **Induce general physiological effects:** Exposure at low doses of radiations (100-250 rads) cause fatigue, nausea, vomiting and loss of hair.
- **Affect immunity:** Exposure at higher doses (400-500 rads) affect bone marrow and ability to fight against infections is compromised.
- **Effects on tissues of vital organs:** Higher radiation doses (10,000 rads) damage tissues of heart, brain, etc.





# Prevention or Control of nuclear hazards

The nuclear hazards can only be prevent or controlled by continuous monitoring and checking activities responsible for radioactive pollution.

Following are the ways to prevent or control these hazards:

- Preventing leakages from nuclear reactors, careless handling, transport and use of radioactive materials.
- Safety and preventive measures should be enforced strictly in areas where activities related to radioactive materials are undertaken.
- Continuous monitoring and quantitative analysis should be carried on in the risk prone areas.
- Radioactive waste must be labelled properly and disposed off very carefully.

