

Environmental challenges

Introduction to Environmental challenges:

1) Industrial Pollution

Toxic Pollution in 1990 was 0.2 million metric Ton, that increased to 0.42 million in 2000 and further to 1.13 million Ton in 2010.

Water Pollution Load was 0.75 million metric Ton in 1990, increased to 1.08 million metric Ton in 2000 and further to 4.15 million metric Ton in 2010.

In 1990, Chemical and Chemical Products caused the most Toxic Load with 0.1 million Ton (51.5%). In 2000 it increased to 61.07% and reduced to 46.36% in 2010.

Basic Metal Industry caused highest water pollution Load of 64.33%, 57.64% and 68.27% in 1990, 2000, 2010. Basic Metal industry also Caused Significant Toxic Pollution in all the Decades.

Chemical and Chemical Products Industry and Basic Metal industries caused the most water and Toxic pollution of total about 40% in all the Decades.

Air Pollution Load in 1990 was 0.96 million metric Ton that increased to 1.8 million metric Ton in 2000 and further to 5.8 million metric Ton in 2010. Chemical and Chemical Products Industry and Basic Metal industries caused the most water and Toxic pollution of total about 45% in all the Decades.

Kanpur is the most polluted city in the World.

People react differently to different types of air pollution. Young children and older adults, whose immune systems tend to be weaker, are often more sensitive to pollution.

Short-term effects of Air Pollution,

1. Pneumonia.
2. Irritation to the nose, throat, eyes, or skin.
3. Headaches, dizziness, and nausea.
4. Bad smells made by factories, garbage, or sewer systems are considered air pollution, too. These odours are less serious but still unpleasant.

Long-term effects

1. Person's death.
2. Heart disease.
3. Lung cancer.
4. Respiratory diseases.
5. Air pollution can also cause long-term damage to people's nerves, brain, kidneys, liver, and other organs.
6. Birth defects.

Effects on The Environment

1. Haze, like smog, is a visible type of air pollution that obscures shapes and colors. Hazy air pollution can even muffle sounds.
2. Air pollution particles eventually fall back to Earth. Air pollution can directly contaminate the surface of bodies of water and soil.
3. This can kill crops or reduce their yield.
4. It can kill young trees and other plants.

How to Prevent:

1. A More Efficient Business

If for example, you are in the manufacturing industry. Review your manufacturing process. Try and discover a way you can use your raw materials in a more efficient manner. For example, check if you can utilise recycled materials within your business's manufacturing process.

2. Consider A Waste Exchange

For some industries, one business's waste can be another's resource. If you'd like to reduce your business's industrial waste, look at the waste that your business produces and discover if your waste can be utilised as a resource in another business's manufacturing process. By exchanging your waste in this manner instead of disposing of it, you are preventing your waste from becoming waste, which is the first step in the waste hierarchy.

3. Reduce the Amount of Packaging

This can be done in two ways. Firstly, you can reduce the amount of packaging on the products that you produce. Secondly, compare the packaging of any products you purchase. Many products have reduced packaging when bought in bulk, so this can be a fantastic way of reducing the amount of waste you produce.

4. Cut Down On Bottled Water!

Many businesses produce waste in the form of plastic drinking bottles. As with all forms of waste, commercial or not, hazardous or not, it is important that we reduce all forms of waste as much as possible in order to protect our precious planet.

2) 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.

The principal cause of acid rain is sulfur and nitrogen compounds from human sources, such as

1. Electrical power generation using coal,
2. Animal agriculture,
3. Factories, and
4. Motor vehicles.

Acid rain has been shown to have

1. Adverse impacts on forests,
2. Freshwaters and
3. Soils,
4. Killing insect and aquatic life-forms,
5. Causing paint to peel,
6. Corrosion of steel structures such as bridges, and weathering of stone buildings and statues.
7. Degrades water quality in rivers, lakes and streams;
8. Damages crops;

How to Prevent:

Industry should use

1. Flue-gas desulfurization to remove sulfur-containing gases from their stack gases.
2. Vehicle emissions control

3) Noise Pollution

Noise pollution, also known as environmental noise or sound pollution, is the propagation of noise with harmful impact on the activity of human or animal life. The average noise level of 97.60 dB obtained exceeded the WHO value of 50 dB allowed for residential areas

Source:

1. Industrial Machines,
2. Transport, and propagation systems.
3. Poor urban planning may give rise to noise pollution, side-by-side industrial and residential buildings can result in noise pollution in the residential areas.
4. Loud music,
5. Lawn care maintenance,
6. Construction,
7. Electrical generators,
8. Explosions, and

9. People.

Effects:

1. Cardiovascular effects in humans
2. Physiological health
3. High stress levels
4. Hearing loss,
5. Sleep disturbances
6. Silent DJs

Noise control

1. Hearing protection (e.g., ear plugs or ear muffs)
2. Purchase of quieter tools and equipment and encourage manufacturers to design quieter equipment. The National Institute for Occupational Safety and Health (NIOSH)
3. Roadway noise can be reduced by the use of Noise barriers,
4. Limitation of vehicle speeds,
5. Alteration of roadway surface texture,
6. Limitation of heavy vehicles,
7. Use of traffic controls that smooth vehicle flow to reduce braking and acceleration, and Tire design.
8. Aircraft noise can be reduced by using Quieter jet engines.
9. Altering flight paths and time of day runway has benefited residents near airports.

4) **Agricultural Pollution**

Agricultural pollution refers to biotic and abiotic byproducts of farming practices that result in contamination or degradation of the environment and surrounding ecosystems, and/or cause injury to humans and their economic interests.

Sources:

1. Pesticide leaching: Pesticide leaching occurs when pesticides mix with water and move through the soil, ultimately contaminating groundwater.
2. Fertilizers: Only a fraction of the nitrogen-based fertilizers is converted to produce and other plant matter. The remainder accumulates in the soil or lost as runoff. The excessive use of nitrogen-containing fertilizers (be they synthetic or natural) is particularly damaging, as much of the nitrogen that is not taken up by plants is transformed into nitrate which is easily leached.
3. Greenhouse gases from fecal waste: About 18% of anthropogenic greenhouse gases come directly or indirectly from the world's livestock.
4. Animal waste

Effects:

1. Soil contamination
2. Contaminating groundwater
3. Blue baby syndrome due to high Nitrogen
4. Greenhouse gases effect

Remedies

1. Conservation tillage is an alternative tillage method for farming which is more sustainable for the soil and surrounding ecosystem. This is done by allowing the residue of the previous harvest's crops to remain in the soil before tilling for the next crop
2. Organic farming
3. Adopting Nutrient Management Techniques:
4. Planting Field Buffers
5. Managing Livestock Access to Streams:

5) Deep Sea Mining

Deep sea mining is a mineral retrieval process that takes place on the ocean floor.

Copper, nickel, aluminium, manganese, zinc, lithium and cobalt,

Effects:

1. Disturbances to the benthic layer
2. Increased toxicity of the water column by Sediment plumes
3. Disturb the habitat of benthic organisms
4. Leakage, spills and corrosion that could alter the mining area's chemical makeup

Prevention:

1. Baseline studies: Comprehensive baseline studies are needed to understand what species live in the deep sea, how they live, and how they could be affected by mining activities.
2. Environmental impact assessments
3. Enhanced regulation

6) Grain Drain

India has achieved record surplus food production, yet there is no Nutrition security for its one billion people. India is moving towards negative growth in coarse grain production. Production of coarse grains is declining as the government promotes only rice and wheat.

Coarse cereals are more nutritious and better suited to drylands.

People have started eating rice subsidised by the government. The health effects are bad, on humans as well as soil and water resources

Overemphasis on rice has led to problems of water scarcity and pest infestation.

International demand for coarse grains is rising. India's drylands can sustain not just the dependant population but also provide some surplus for trade. Immediate policy intervention is needed to put coarse grains on the same footing in the market as rice and wheat.

7) Green Energy

Sustainable energy is the practice of using energy in a way that "meets the needs of the present without compromising the ability of future generations to meet their own needs.

1. Solar Power
2. Solar Heating
3. Wind Power
4. Hydropower
5. Biomass
6. Ocean Energy
7. Geothermal Energy



8) Asia Brown Cloud/Atmospheric Brown Clouds

The Indian Ocean brown cloud or Asian brown cloud is a layer of air pollution that recurrently covers parts of South Asia, namely the northern Indian Ocean, India, and Pakistan. This pollution layer was observed during the Indian Ocean Experiment (INDOEX)

Effects:

Health problems

1. One major impact is on health. Nearly two million people die each year, in Asia alone, from conditions related to the brown cloud.

Regional weather

2. Changes of rainfall patterns with the Asian monsoon, as well as a delaying of the start of the Asian monsoon, by several weeks.
3. Cyclone intensity in Arabian Sea: A 2011 study found that pollution is making Arabian Sea cyclones more intense as the atmospheric brown clouds has been producing weakening wind patterns which prevent wind shear patterns that historically have prohibited cyclones in the Arabian Sea from becoming major storms.
4. Global warming and solar dimming

9) Domestically Prohibited Goods

Domestically prohibited goods are products which are banned or severely restricted on the domestic market of the exporting country because they are determined to present risks for human, animal or plant life or health, or the environment, but which may nevertheless be exported.

Chemicals (including pesticides and fertilisers), Pharmaceutical products, Consumer products and Hazardous wastes.

10) Solid Waste Disposal

Disposal of solid wastes is a stinging and widespread problem in both urban and rural areas in many developed and developing countries. Municipal solid waste (MSW) collection and disposal is one of the major problems of urban environment in most countries worldwide today.

Methods:

1. Landfills: - Landfilling is the most simple and economical measure as far as natural decomposition occurs at the disposal site
2. Underground injection wells: -
3. Land treatment: -

III Effects:

1. Chemical poisoning through chemical inhalation
2. Uncollected waste can obstruct the storm water runoff resulting in flood
3. Low birth weight
4. Cancer
5. Neurological disease
6. Nausea and vomiting
7. Mercury toxicity from eating fish with high levels of mercury
8. Plastic found in oceans ingested by birds
9. Resulted in high algal population in rivers and sea.
10. Degrades water and soil quality

Prevention

1. Generation of waste should be decreased
2. Promoting the production of goods which minimize waste generation after use
3. Material recycling and recovery should be increased
4. Promoting the use of plastic recycling identification codes and labels in order to make sorting and recycling of plastic packaging easier

11) Pesticide Residues in soft drinks

A total of 12 brands-most popular and easily available -- were considered in this particular study. PML tested the samples with a widely and internationally used methodology based on United States Environment Protection Agency (USEPA) methodology for organochlorine pesticide and organophosphorus pesticide detection. Extraction was done as per the given methodology and analysis by Gas Chromatograph with Electron Capture Detector and with Nitrogen Phosphorus detector using a capillary column.

12) Contamination of Drinking Water

Drinking water sources include surface water, such as rivers, lakes, and reservoirs; and groundwater aquifers, which are subsurface layers of porous soil and rock that contain large collections of water

Several types of drinking water contaminants may be of concern for children's health. Examples include microorganisms, (e.g., E. coli, Giardia, and noroviruses), inorganic chemicals (e.g., lead, arsenic, nitrates, and nitrites), organic chemicals (e.g., atrazine, glyphosate, trichloroethylene, and tetrachloroethylene), and disinfection byproducts (e.g., chloroform).

FDA regulates bottled drinking water, while

EPA regulates drinking water provided by public water systems.

Microbial contaminants include bacteria, viruses, and protozoa that may cause severe gastrointestinal illness

13) Global Warming-Climate Change

Global warming is an environmental phenomenon caused by natural and anthropogenic air pollution. It refers to rising air and ocean temperatures around the world. This temperature rise is at least partially caused by an increase in the amount of greenhouse gases in the atmosphere. Greenhouse gases trap heat energy in the Earth's atmosphere. (Usually, more of Earth's heat escapes into space.)

Carbon dioxide is a greenhouse gas that has had the biggest effect on global warming. Carbon dioxide is emitted into the atmosphere by burning fossil fuels (coal, gasoline, and natural gas). Humans have come to rely on fossil fuels to power cars and planes, heat homes, and run factories. Doing these things pollutes the air with carbon dioxide.

Other greenhouse gases emitted by natural and artificial sources also include methane, nitrous oxide, and fluorinated gases. Methane is a major emission from coal plants and agricultural processes. Nitrous oxide is a common emission from industrial factories, agriculture, and the burning of fossil fuels in cars. Fluorinated gases, such as

hydrofluorocarbons, are emitted by industry. Fluorinated gases are often used instead of gases such as chlorofluorocarbons (CFCs). CFCs have been outlawed in many places because they deplete the ozone layer.

Worldwide, many countries have taken steps to reduce or limit greenhouse gas emissions to combat global warming. The Kyoto Protocol, first adopted in Kyoto, Japan, in 1997, is an agreement between 183 countries that they will work to reduce their carbon dioxide emissions. The United States has not signed that treaty.

14) Linking of Rivers

The Indian Rivers Inter-link is a proposed large-scale civil engineering project that aims to effectively manage water resources in India by linking Indian rivers by a network of reservoirs and canals to enhance irrigation and groundwater recharge, reduce persistent floods in some parts and water shortages in other parts of India

15) Damage by Detergents

Detergents are organic compounds, which have both polar and non-polar characteristics. They tend to exist at phase boundaries, where they are associated with both polar and non-polar media. Detergents are of three types: anionic, cationic, and non-ionic. Anionic and cationic have permanent negative or positive charges, attached to non-polar (hydrophobic) C-C chains. Non-ionic detergents have no such permanent charge; instead, they have a number of atoms which are weakly electropositive and electronegative.

Detergents can have poisonous effects in all types of aquatic life if they are present in sufficient quantities, and this includes the biodegradable detergents.

All detergents destroy the external mucus layers that protect the fish from bacteria and parasites; plus they can cause severe damage to the gills.

Most fish will die when detergent concentrations approach 15 parts per million. Detergent concentrations as low as 5 ppm will kill fish eggs. Surfactant detergents are implicated in decreasing the breeding ability of aquatic organisms.

Detergents also add another problem for aquatic life by lowering the surface tension of the water. Organic chemicals such as pesticides and phenols are then much more easily absorbed by the fish. A detergent concentration of only 2 ppm can cause fish to absorb double the amount of chemicals they would normally absorb, although that concentration itself is not high enough to affect fish directly.

Phosphates in detergents can lead to freshwater algal blooms that releases toxins and deplete oxygen in waterways. When the algae decompose, they use up the oxygen available for aquatic life.

16) Loss of Biodiversity

Biodiversity loss is the extinction of species (plant or animal) worldwide, and also the local reduction or loss of species in a certain habitat.

Causes:

1. Habitat loss and degradation: Land use intensification (and ensuing land loss/habitat loss) has been identified to be a significant factor in loss of ecological services due to direct effects as well as biodiversity loss.
2. Climate change through heat stress and drought stress
3. Excessive nutrient load and other forms of pollution
4. Over-exploitation and unsustainable use (e.g. unsustainable fishing methods) we are currently using 25% more natural resources than the planet
5. Armed conflict, which disrupts human livelihoods and institutions, contributes to habitat loss, and intensifies over-exploitation of economically valuable species, leading to population declines and local extinctions.
6. Invasive alien species that effectively compete for a niche, replacing indigenous species

Prevention

1. Government legislation
2. Nature preserves
3. Reducing invasive species
4. Habitat restoration
5. Research
6. Reduce climate change
7. Purchase sustainable products
8. Sustainable living
9. Education



17) E-Waste

Electronic waste or e-waste describes discarded electrical or electronic devices. Used electronics which are destined for refurbishment, reuse, resale, salvage recycling through material recovery, or disposal are also considered e-waste.

E-waste is considered the “fastest-growing waste stream in the world” with 44.7 million tonnes generated in 2016- equivalent to 4500 Eiffel towers.

In 2018, an estimated 50 million tonnes of e-waste was reported, thus the name ‘tsunami of e-waste’ given by the UN. Its value is at least \$62.5 billion annually.

Globally, e-waste constitutes more than 5 percent of all municipal solid waste. Only 15–20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators.

The rapid expansion of technology and the consumption driven society results in the creation of a very large amount of e-waste in every minute.

Changes in media (tapes, software, MP3), falling prices

Effects:

Lead, barium and other heavy metals leaching into the ground water and release of toxic phosphor

Air emissions and discharge into rivers

How to Prevent:

Being able to simply replace the part of the phone that is broken will reduce e-waste

Processing techniques: In many developed countries, electronic waste processing usually first involves dismantling the equipment into various parts (metal frames, power supplies, circuit boards, plastics)

Acid bath as a technique for e-waste disposal includes dousing of the electronic circuits in the incredible sulphuric, hydrochloric or nitric corrosive solutions that disengage the metals from the electronic pathways.

