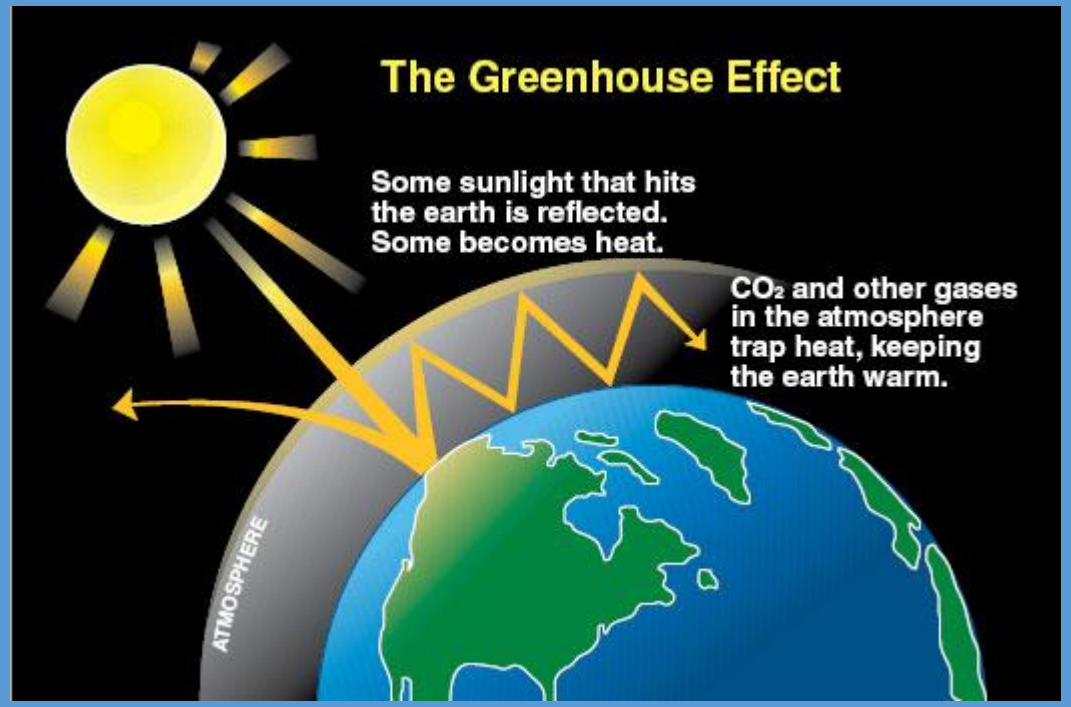
Industrial Management
Unit - V

Greenhouse effect

- "It is a natural process that that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases"



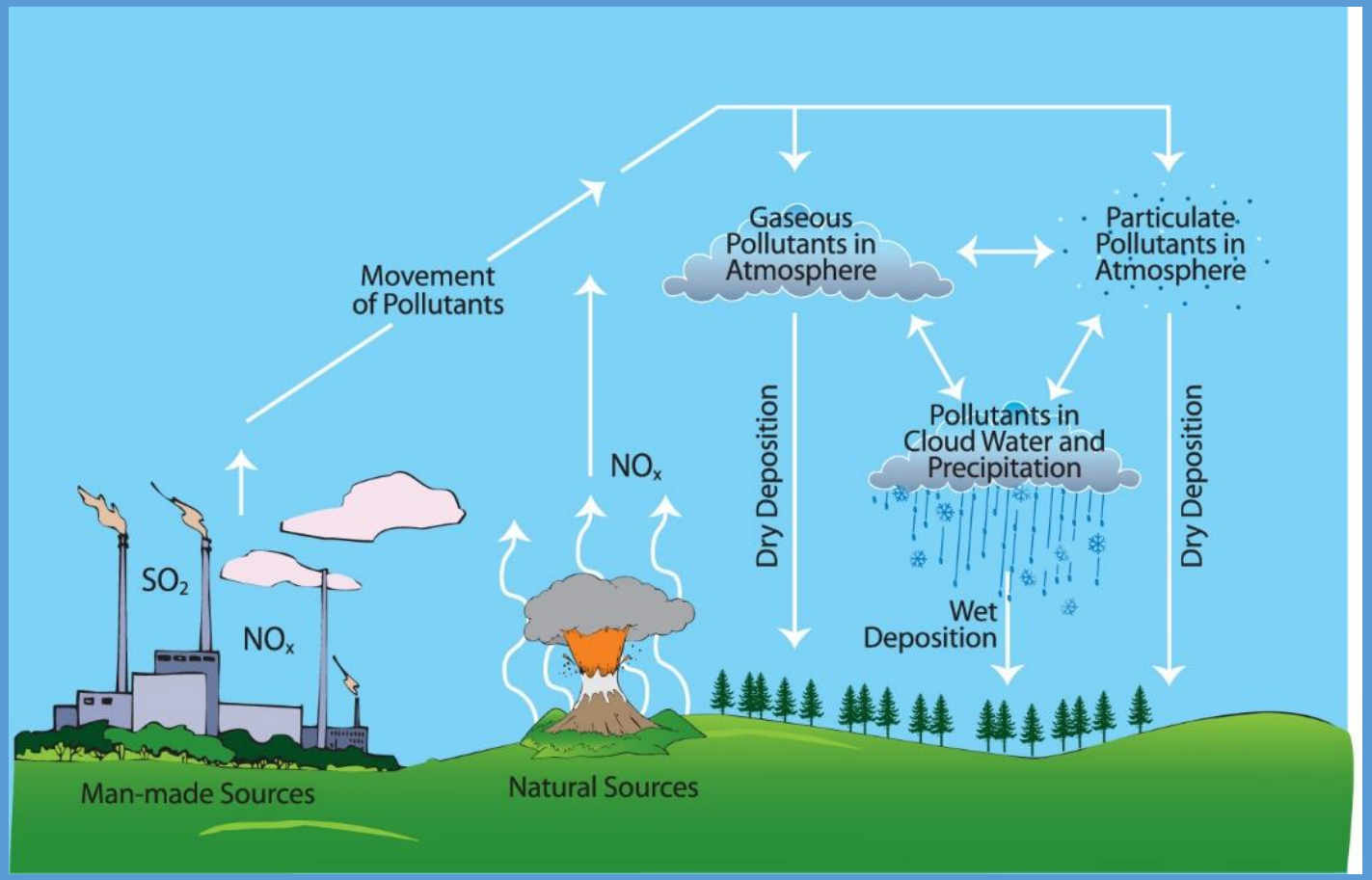
Greenhouse gases include water vapour, carbon dioxide, methane, nitrous oxide, ozone and some artificial chemicals such as chlorofluorocarbons (CFCs).

The steps of Greenhouse effect can be written as -

- Step 1: Solar radiation reaches the Earth's atmosphere - some of this is reflected back into space.
- Step 2: The rest of the sun's energy is absorbed by the land and the oceans, heating the Earth.
- Step 3: Heat radiates from Earth towards space.
- Step 4: Some of this heat is trapped by greenhouse gases in the atmosphere, keeping the Earth warm enough to sustain life.
- Step 5: Human activities such as burning fossil fuels, agriculture and land clearing are increasing the amount of greenhouse gases released into the atmosphere.
- Step 6 : This is trapping extra heat, and causing the Earth's temperature to rise.

Acid rain

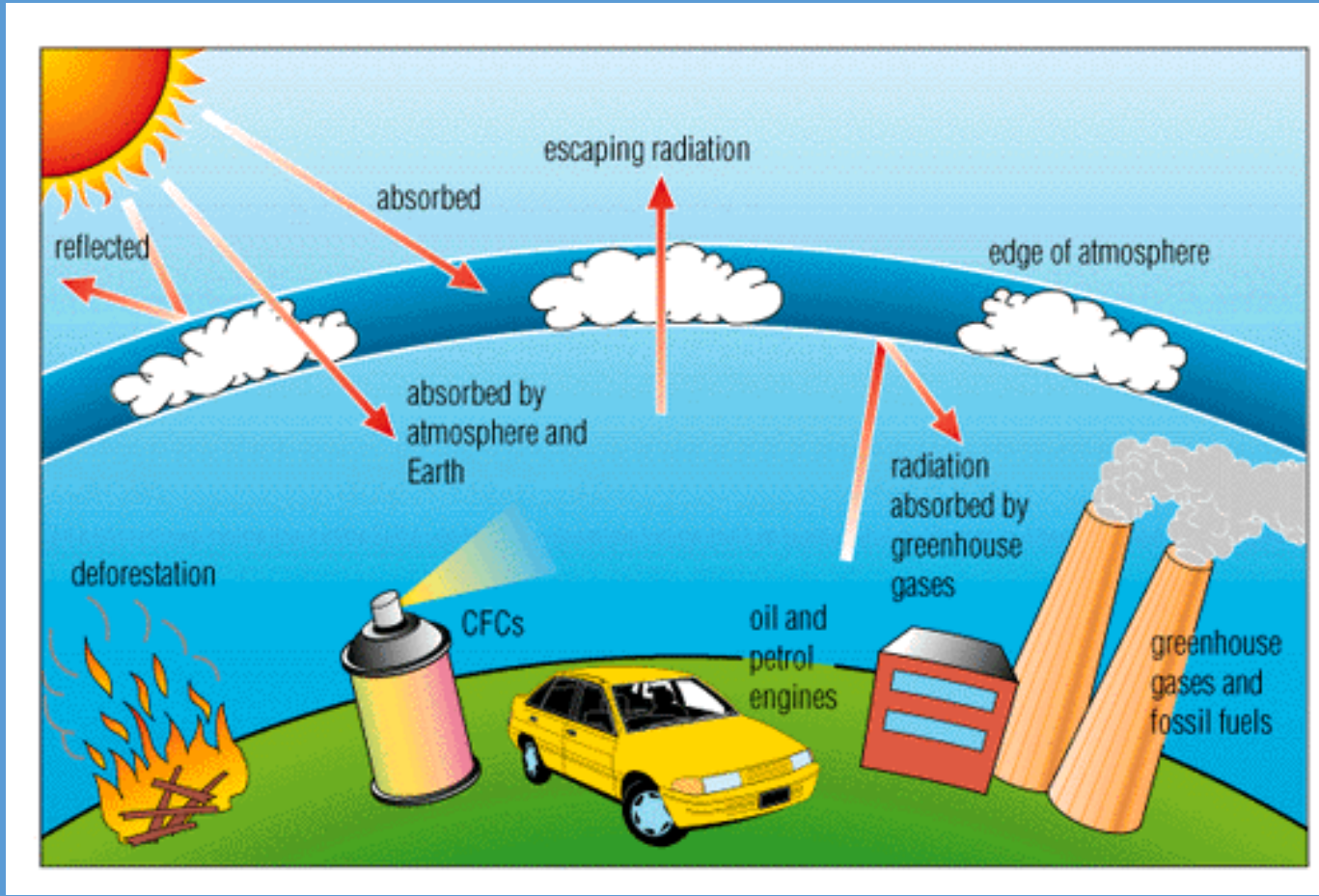
- "Acid rain is a rain or any other form of precipitation that is unusually acidic, meaning that it possesses elevated levels of hydrogen ions (low pH). It can have harmful effects on plants, aquatic animals and infrastructure"



- Acid rain has many ecological effects, but none is greater than its impact on lakes, streams, wetlands, and other aquatic environments. Acid rain makes waters acidic and causes them to absorb the aluminium that makes its way from soil into lakes and streams. This combination makes waters toxic to crayfish, clams, fish, and other aquatic animals.
- Acid rain also damages forests, especially those at higher elevations. It robs the soil of essential nutrients and releases aluminium in the soil, which makes it hard for trees to take up water.
- The only way to fight acid rain is by curbing the release of the pollutants that cause it. This means burning fewer fossil fuels. Many governments have tried to curb emissions by cleaning up industry smokestacks and promoting alternative fuel sources. These efforts have met with mixed results. But even if acid rain could be stopped today, it would still take many years for its harmful effects to disappear.

Global warming

- " It is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which trap heat that would otherwise escape from Earth"



Some of the effects of global warming are as follows -

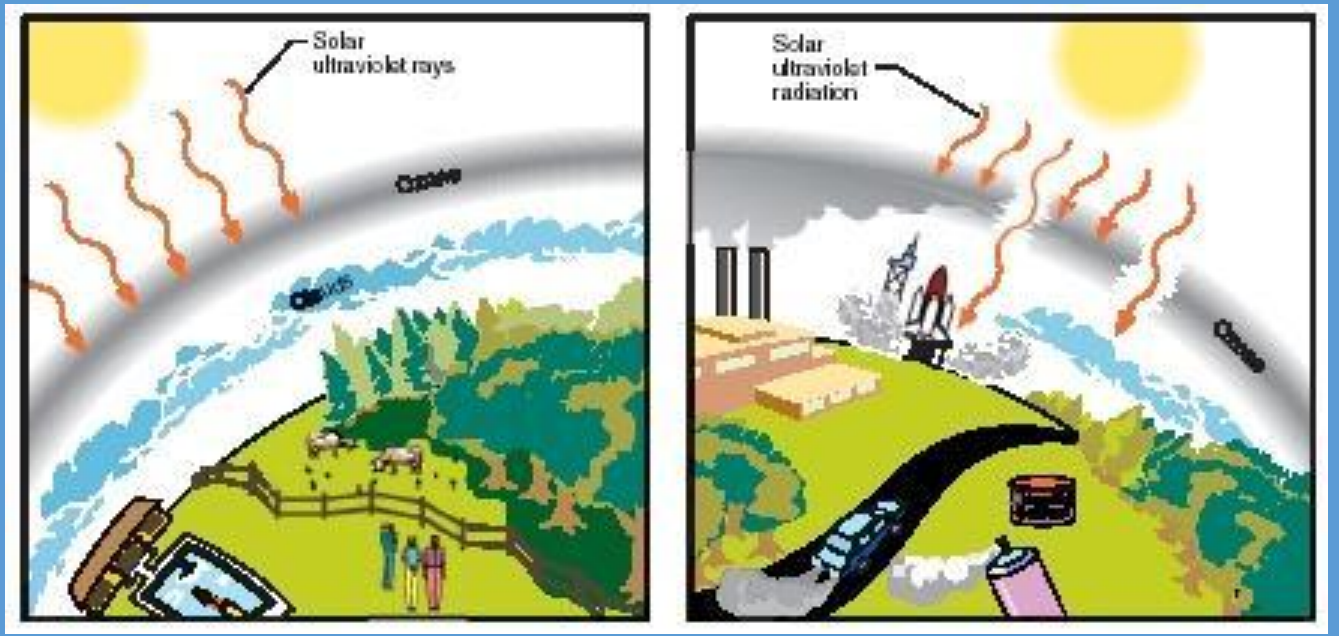
- Rising sea level.
- Changes in rainfall patterns.
- Increased likelihood of extreme events (like flood, earthquake)
- Melting of ice caps.
- Damage to coral reefs due to warm oceans.
- Melting glaciers.
- Widespread vanishing of animal populations.

The technologies and approaches outlined below are all needed to bring down the emissions of these gases by at least 80 percent by mid-century :-

- Boosting energy efficiency.
- Use of renewable energy resources.
- Managing forests and agriculture.
- Developing & deploying new low-carbon and zero-carbon technologies.
- Ensuring Sustainable development.

Ozone layer depletion

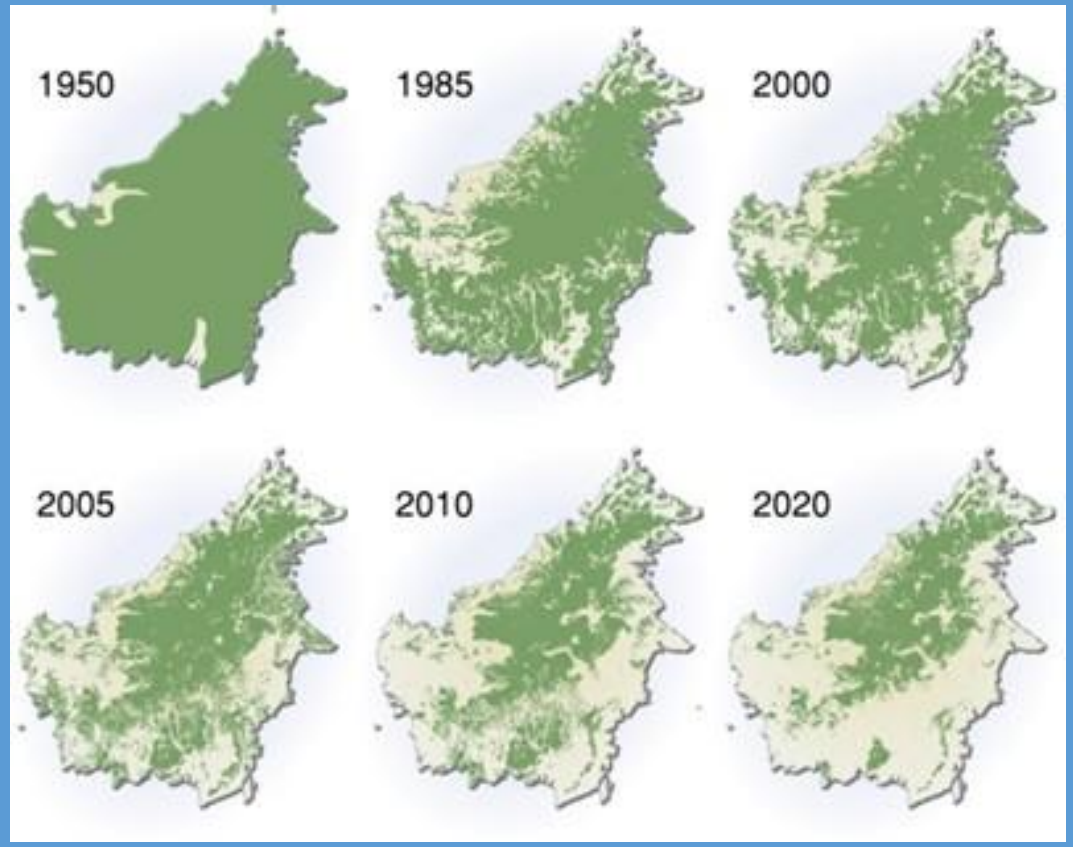
- "When CFCs and HCFCs reach the stratosphere, the ultraviolet radiation from the sun causes them to break apart and release chlorine atoms which react with ozone, starting chemical cycles of ozone destruction that deplete the ozone layer. One chlorine atom can break apart more than 100,000 ozone molecules"



- The ozone layer is a belt of naturally occurring ozone gas that sits 9.3 to 18.6 miles (15 to 30 kilometers) above Earth and serves as a shield from the harmful ultraviolet B radiation emitted by the sun.
- When CFCs reach the upper atmosphere, they are exposed to ultraviolet rays, which causes them to break down into substances that include chlorine. The chlorine reacts with the oxygen atoms in ozone and rips apart the ozone molecule.
- About 90 percent of CFCs currently in the atmosphere were emitted by industrialized countries in the Northern Hemisphere, including the United States and Europe. These countries banned CFCs by 1996, and the amount of chlorine in the atmosphere is falling now. But scientists estimate it will take another 50 years for chlorine levels to return to their natural levels.

Deforestation

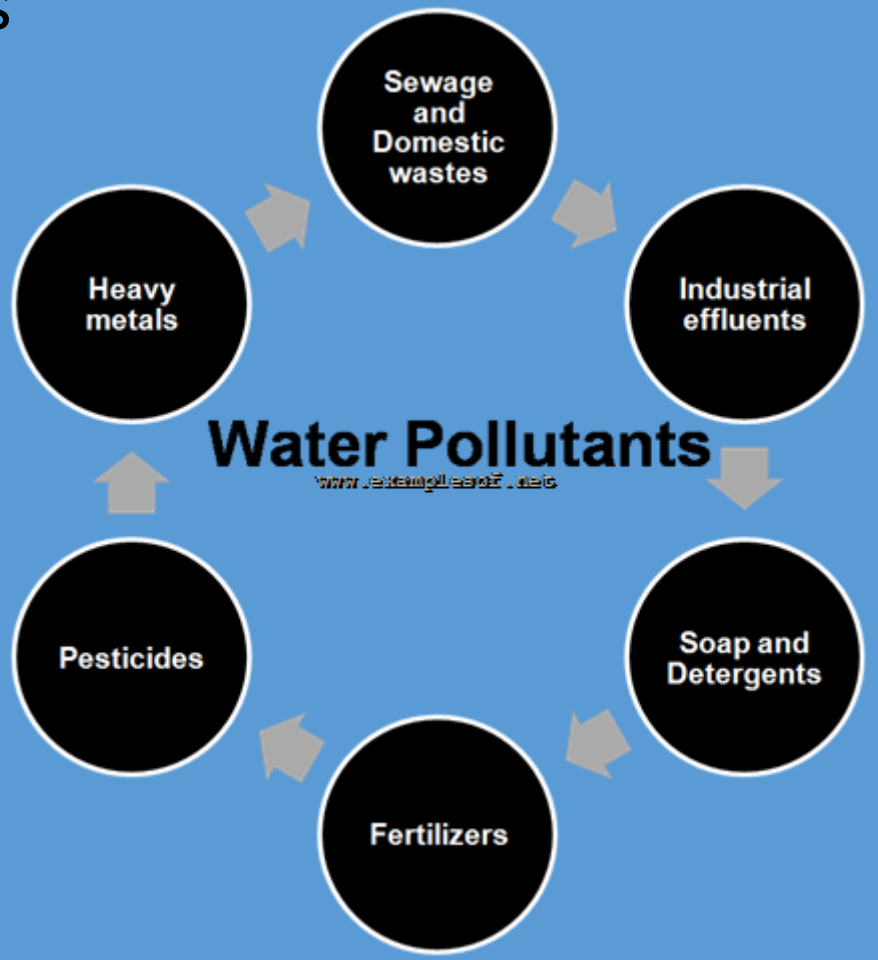
- "It is the clearance or clearing is the removal of a forest or stand of trees where the land is thereafter converted to a non-forest use"



- The world’s rain forests could completely vanish in a hundred years at the current rate of deforestation.
- Forests are cut down for many reasons, but most of them are related to money or to people’s need to provide for their families. The biggest driver of deforestation is agriculture. Farmers cut forests to provide more room for planting crops or grazing livestock. Often many small farmers will each clear a few acres to feed their families by cutting down trees and burning them in a process known as “slash and burn” agriculture.
- Not all deforestation is intentional. Some is caused by a combination of human and natural factors like wildfires and subsequent overgrazing, which may prevent the growth of young trees.
- Deforestation has many negative effects on the environment. The most dramatic impact is a loss of habitat for millions of species. Seventy percent of Earth’s land animals and plants live in forests, and many cannot survive the deforestation that destroys their homes.

Water pollution

- **“Water pollution** is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). This form of environmental degradation occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds”



- Water pollutant sources can be grouped into two categories:

(a) point sources which can be attributed to discrete discharge from a factory or sewage outfall

(b) (b) non-point sources that include agricultural runoff, urban stormwater runoff and other area wide sources.

The most significant physical pollutant is excess sediment in runoff from agricultural plots, clearcut forests, improperly graded slopes, urban streets and other poorly managed lands, especially when steep slopes or lands near streams are involved. Other physical pollutants include a variety of plastic refuse products such as packaging materials

- Minimization of pollutants :

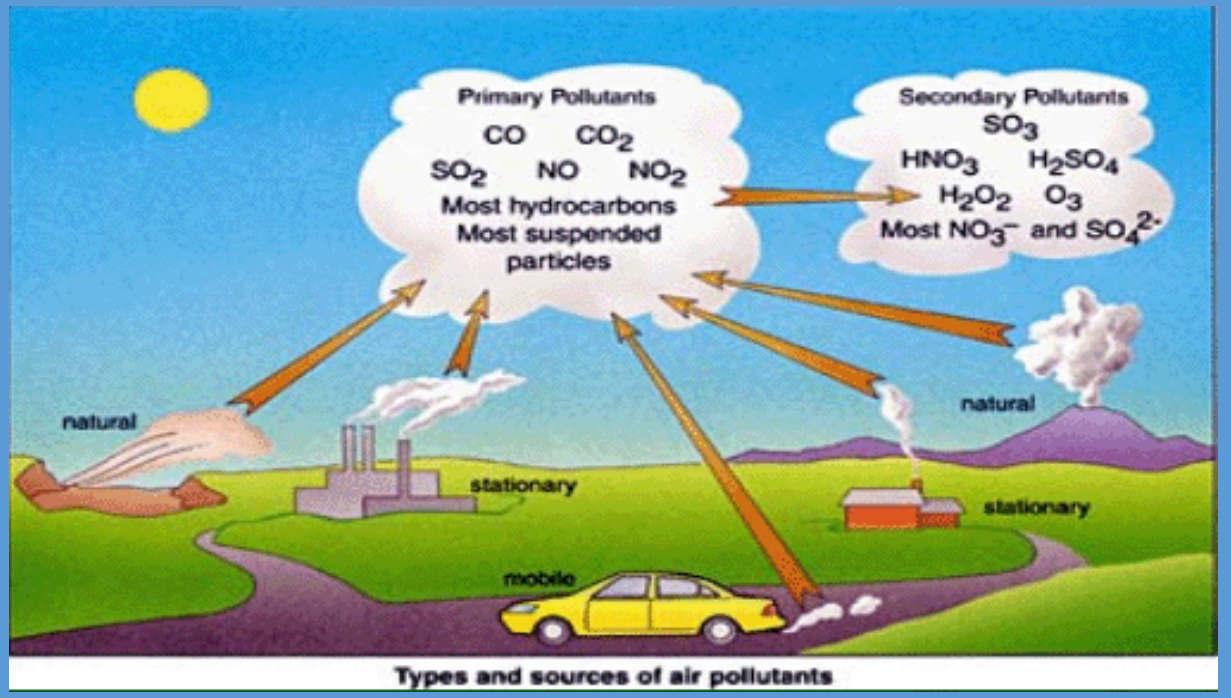
A resource becomes a waste when it can no longer be economically utilised or recovered. It is then disposed of in the environment in the cheapest manner possible. Availability of economical technology for resource processing and usage has been a main determinant of when the resource is discarded as waste.

- Wastewater treatment at source :

The multitude of different wastewater treatment technologies can be classified as physical, chemical and biological processes, depending on the nature of the purification mechanism employed. The character of the pollutants and the form (suspended or dissolved) in which they are present usually determine the most suitable process for their removal.

Air pollution

- “**Air pollution** is the introduction of particulates, biological molecules, or other harmful materials into the Earth's atmosphere, causing disease, death to humans, damage to other living organisms such as food crops, or the natural or built environment. It may come from anthropogenic or natural sources”



Types and sources of air pollutants

- Air pollution is a problem everywhere in the world. Local air pollution usually affects big cities. Air pollution becomes a worldwide problem when local pollution moves away from where it came from.
- **There are two types of pollutants:**

Primary pollutants- are those gases or particles that are pumped into the air to make it unclean. They include carbon monoxide from automobile (cars) exhausts and sulphur dioxide from the combustion of coal.

Secondary pollutants- When pollutants in the air mix up in a chemical reaction, they form an even more dangerous chemical. Photochemical smog is an example of this, and is a secondary pollutant.

Methods of air pollution control :

- Governments are also forcing companies to be more responsible with their manufacturing activities, so that even though they still cause pollution, they are a lot controlled.
- Car manufacturing companies are also building more energy efficient cars, which pollute less than before.
- Encourage your family to use the bus, train or bike when commuting. If we all do this, there will be less cars on road and less fumes.
- Recycle and re-use things. This will minimize the dependence of producing new things.
- Use energy (light, water, boiler, kettle and fire woods) wisely.

Noise pollution

- “**Noise pollution** or noise disturbance is the disturbing or excessive **noise** that may harm the activity or balance of human or animal life. The source of most outdoor noise worldwide is mainly caused by machines and transportation systems, motor vehicles, aircraft, and trains”

- Noise is considered as environmental pollution, even though it is thought to have less damage on humans than water, air or land pollution. But people who are affected by severe noise pollution know that it is a massive issue that needs attention.
- Generally, problems caused by noise pollution include stress related illnesses, speech interference, hearing loss, sleep disruption, and lost productivity.
- Nuisance is usually used to describe an activity or condition that is harmful or annoying to others.

e.g Barking dogs, car alarms, places of worship, parties, pubs, air conditioning units etc

- Methods of prevention of noise pollution :

1. Noise producing industries, airports, bus and transport terminals and railway stations to sighted far from where living places.
2. Community laws must silence zones near schools / colleges, hospitals etc.
3. Community law enforcers should check the misuse of loudspeakers, worshipers, outdoor parties and discos, as well as public announcements systems.
4. Trees along roads and in residential areas is a good way to reduce noise pollution as they absorb sound.
5. Community laws must silence zones near schools / colleges, hospitals etc.

Govt. initiatives for environmental pollution

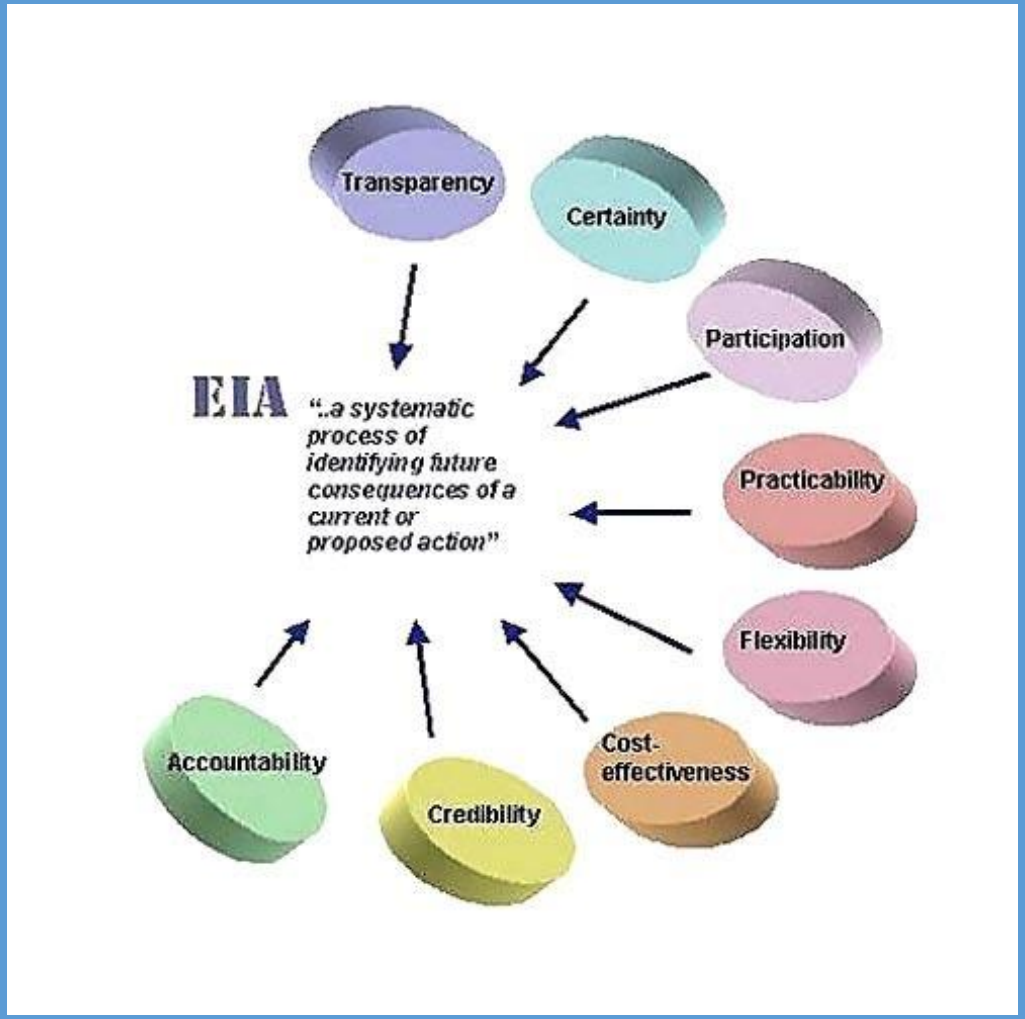
- Some of the economic incentives introduced are –

1. Water Cess act 1977.
2. Effluent charges.
3. Credit & Loan at cheap interest rates.
4. Customs or excise duties & sales tax rebate.
5. Investment allowance.

- Strengthening of emission standards.
- Eco-labelling.
- Scheme for adoption of cleaner technologies in small scale industries.

Environment Impact Assessment

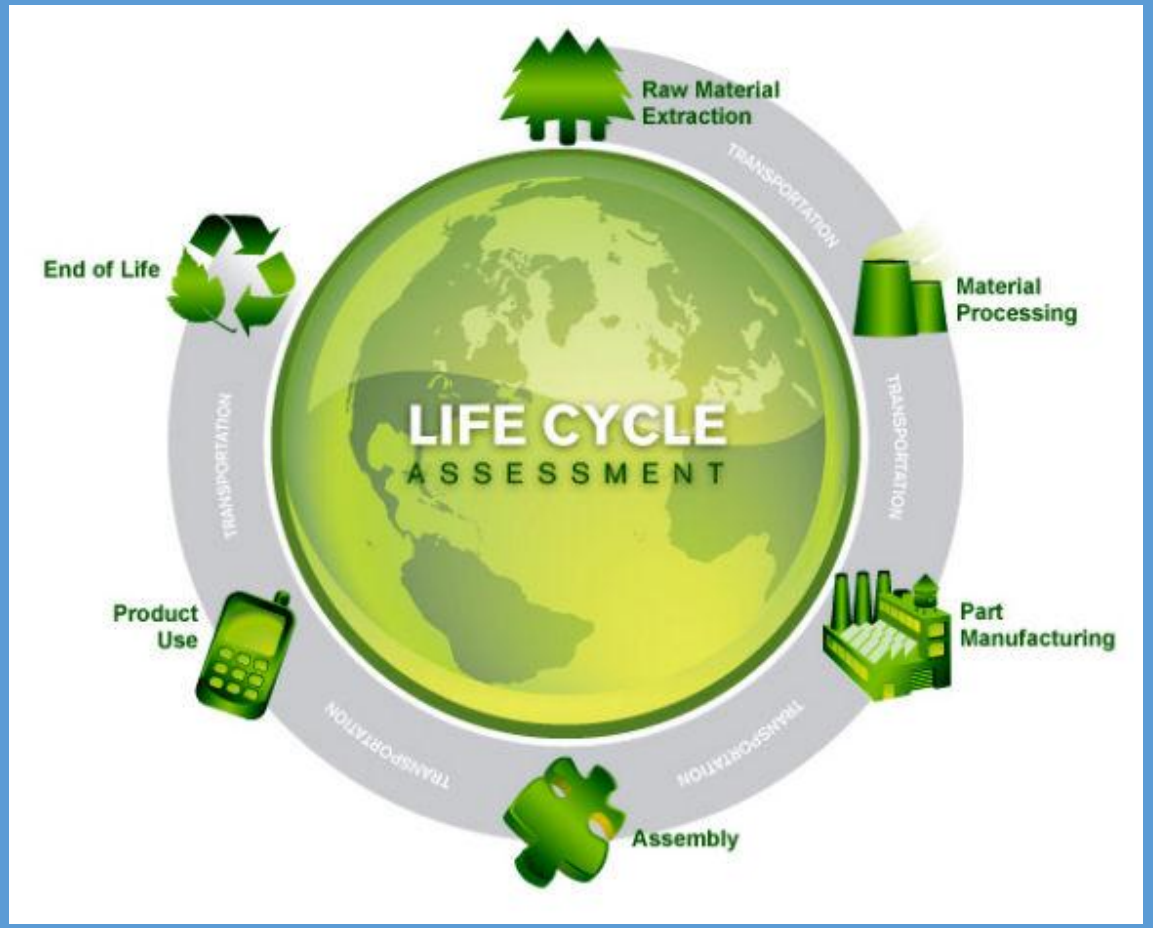
- “It is a formal process used to predict the environmental consequences (+ve or –ve) of a plan, policy, program or project prior to the decision t move forward with the proposed action”



- It may propose measures to adjust impacts to acceptable levels or to investigate new technological solutions.
- The purpose of the assessment is to ensure that decision makers consider the environmental impacts when deciding whether or not to proceed with a project.
- EIA is used as a decision aiding tool rather than decision making tool.
- They have been criticized for excessively limiting their scope in space an time.

Life-Cycle Assessment

- “It is a technique assess environmental impacts associated with all the stages of a product’s life from cradle to grave (i.e. raw material extraction, manufacturing, distribution, use, repair & maintainance, disposal & recycling)”



- It is also known as life-cycle analysis, ecobalance and cradle-to-grave analysis.
- The goal of LCA is to compare the full range of environmental effects assignable to products and serviced by quantifying all inputs and outputs of material flows and assessing how these material flows impact the environment.
- LCA has major roles in environmental impact assessment, integrated waste management and pollution studies.

- LCAs can help avoid a narrow outlook on environmental concerns by:

❖Compiling an inventory of relevant energy and material inputs and environmental releases.

❖Evaluating the potential impacts associated with identified inputs and releases.

❖Interpreting the results to help make a more informed decision.

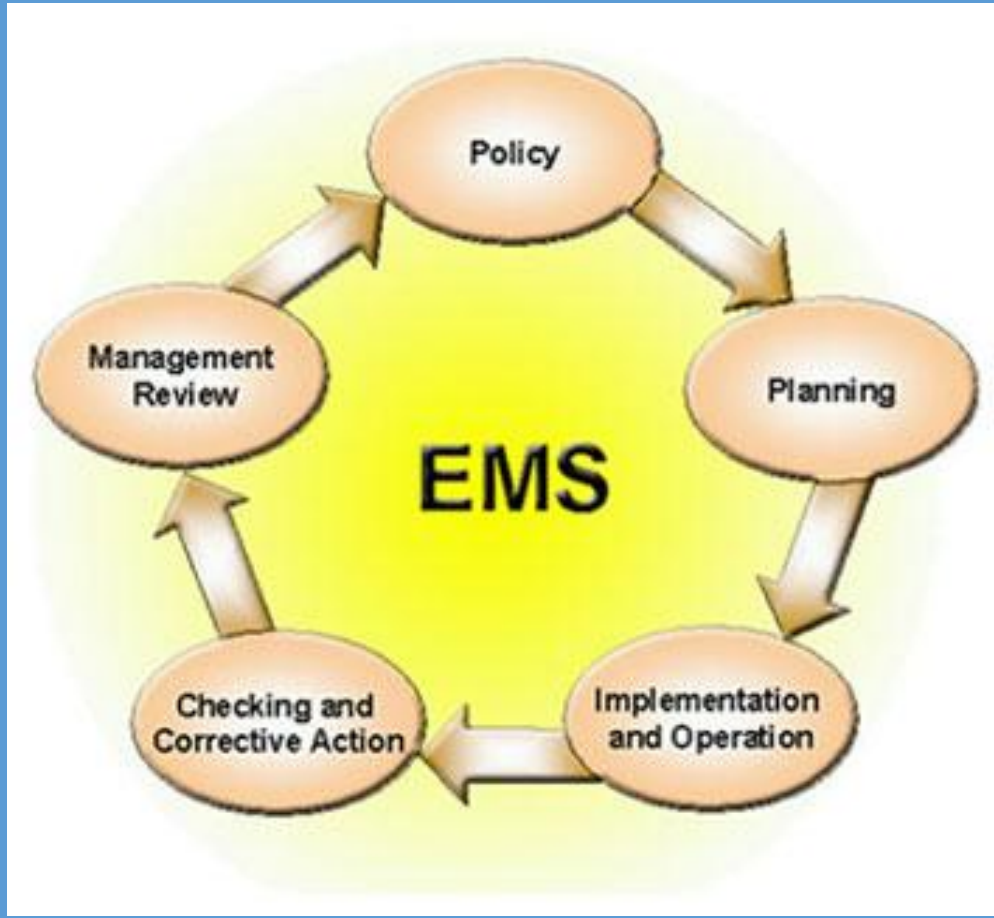
Environmental Benchmarking

- “It is effectively a tool for analysing environmentally related practices and indicators which lead to superior environmental performance, while also enhancing economic performance”

- Benchmarking is a framework within which indicators and best practices are examined in order to determine areas where company performance can be improved.
- It helps companies achieve good environmental performance by learning from ‘best-in-class’ companies.
- The scope of environmental benchmarking should include all areas of company’s activities and not be restricted solely to those activities that have an obvious environmental impact.
- It may include an assessment of environmental management systems, environmental accounting, emergency response etc.

Environmental Management System

“It refers to the management of an organization’s environmental programs in a comprehensive, systematic, planned and documented manner”



- It includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection.
- The goal of EMS are to increase compliance and reduce waste.
- Some features of EMS are –

1. Provides a systematic way of managing an organization's environmental affairs.
2. Sets framework for training to achieve objectives and desired performance.
3. Encourages contractors and suppliers to establish their own EMS.
4. Serves as a tool, or a process, to improve environmental performance and information.

Environment Protection Act, 1986

- Objectives of the act are :-

✓To co-ordinate the activities of the various regulatory agencies already in existence.

✓Creation of an authority or authorities with adequate powers for environmental protection.

✓Regulation of discharge of environmental pollutants and handling of hazardous substance.

✓Speedy response in the event of accidents threatening environmental and deterrents punishment to those who endanger human environment, safety and health.

Water Act, 1974

- The Central Board may perform all or any of the following functions, namely :-

✓Co-ordinate the activities of the State Boards and resolve disputes among them

✓Plan and execute a nation-wide programme for the prevention, control or abatement of water pollution

✓Organise through mass media a comprehensive programme regarding the prevention and control of water pollution

✓Advise the Central Government on any matter concerning the prevention and control of water pollution

✓Plan and organise the training of persons engaged or to be engaged in programmes for the prevention, control or abatement of water pollution