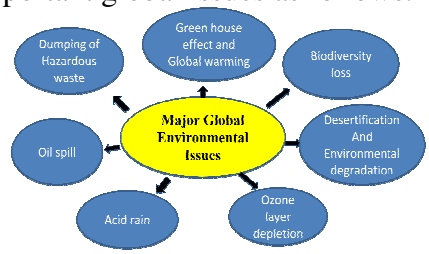
14. GLOBAL ENVIRONMENTAL ISSUES

The developmental discrepancies in different regions of the world pose a serious threat to our common global environment consequently; we are confronted with complex environmental issues deserving attention.

The important global issues as follows:



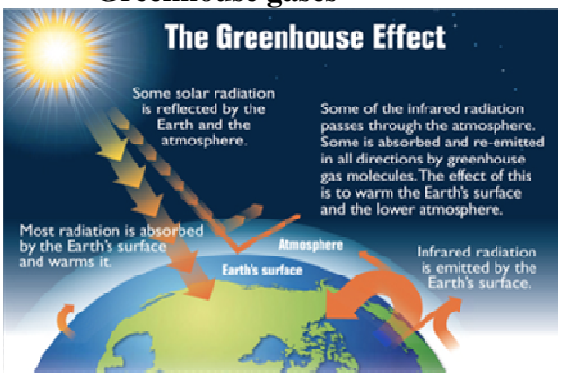
The term "greenhouse effect" has been derived from a phenomenon that occurs in a green house.

A Greenhouse looks like a small **glass house** that is used for growing plants especially during winters.

Its glass panel lets the sun light in i.e. absorbed inside, releasing heat radiations. But these heat radiations cannot escape out of the glass panel.

Without greenhouse effect, the average temperature at surface of earth would have been a chilly -18^0 C rather than the present average 18^oC.

- **Greenhouse gases**



GREENHOUSE GASES	SOURCE OF EMISSION
CARBON DIOXIDE	Burning fossil fuel, solid waste, trees, wood products, as a result of certain chemical reactions like manufacturing of cement, deforestation
METHANE	Emitted during production and transport of coal, natural gas and oil, decay of organic waste in municipal solid waste landfill, burning fossil fuel, solid waste and landfill
NITROUS OXIDE	Emitted during agricultural and industrial activities, also during combustion of fossil fuels and solid waste
FLUORINATED GASES	Hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride are emitted from a number of industrial processes, refrigeration, aero propellants, solvents, insulation foams

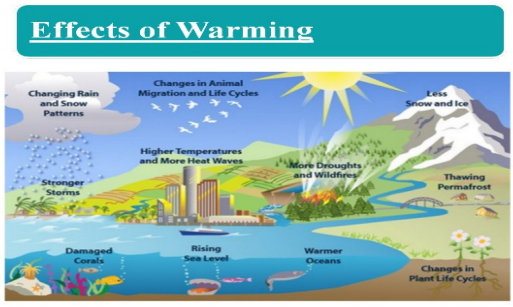
Causes of Global Warming are:

- Population growth,
- Deforestation,
- Burning of organic matter,
- Excessive use of fertilizers,
- Burning of fossil fuels, all of these result in Increased carbon-dioxide

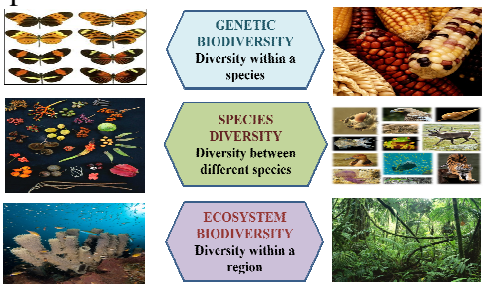
Consequences of Global Warming

- Climate change.
- Melting of polar ice cap/melting of ice-glaciers.
- Warming up of ocean water.
- Rise in sea level and melting of polar ice cap/melting of ice-glaciers.
- Flooding and erosion of coastal areas because of rising sea level.
- Inundation of low regions of the earth like Netherland, Bangladesh.
- More violent weather—hurricane, storms and tornadoes with increased velocity.
- Change in regional and local weather pattern.
- Change in rainfall pattern resulting in flash floods.
- Effect on Natural ecosystem and wildlife.
- Decline in agricultural productivity.

- **Effects of Global Warming**

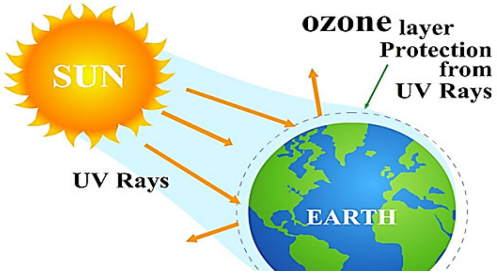


- **Strategies to cope with green house effect and global warming**
  - ➢ We cannot stop the rise of Carbon dioxide completely but can definitely slow it down.
  - ➢ More fuel-efficient cars→Drive less, →drive smart.
  - ➢ Use more energy efficient appliances, use of fluorescent rather than in electricity usage (turn off the lights and TV when not using them) can reduce candescent light bulbs, and careful monitoring of home our energy needs.
  - ➢ Improved insulation to decrease the fuel burned to heat and cool our homes.
  - ➢ Development/ implementation of non-fossil fuel alternatives like wind and solar power.
  - ➢ Stopping deforestation around the world—supporting and undertaking tree plantation—afforestation---will keep that carbon in the forest rather than sending it back into the atmosphere as the trees are burned or decay and are not replaced by more.
  - ➢ Planting large areas with trees will consume CO_2 as the trees grow, until the forests mature.
  - ➢ Follow 3Rs(Reduce, Reuse, Recycle)
  - ➢ Moreover leaders, local planners, farmers, health organizations, need to recognize the changing climate and rising sea level as they make plans for the future.
  - ➢ Our citizens need to be educated as to likely changes and how best to deal with the changing conditions. Encourage others to conserve energy**.**
- Biodiversity refers to the total number of species found in an area or region. Of the combined biodiversity at all levels of biological organisation, the three most important levels are:

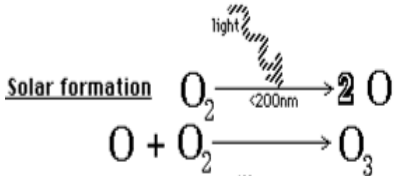


- **Main causes of biodiversity:**
  - ➢ Habitat loss.
  - ➢ Introduction of non-native species.
  - ➢ Oil spill, Pollution of air, water and land , environmental degradation, global warming.
- **Ozone layer depletion**

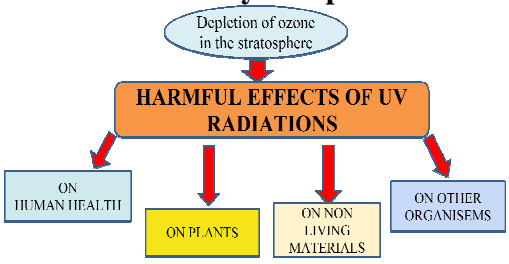
Ozone layer is found in the form of a very thin layer ,in the lower portion of the stratosphere from about 20-30 km from the earth's surface. 90% of the atmospheric ozone is present in this layer.



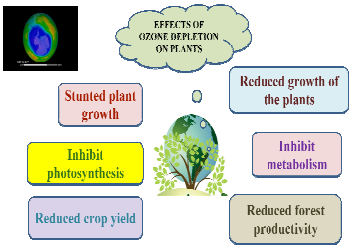
- Formation of ozone molecule
  - ➢ Atmospheric oxygen gets photolyzed by UV rays to form free oxygen atom
  - ➢ Oxygen atom so produced are very reactive
  - ➢ One oxygen atom reacts with one molecule of oxygen of the atmosphere to form ozone



  - ➢ At the same time natural destruction of ozone also takes place.
  - ➢ Ozone reacts with oxygen radical and gets reduced to molecular oxygen.
  - ➢ The thinning of stratospheric ozone layer is called "ozone hole".
  - ➢ Ozone layer can be destroyed both by natural and manmade causes.
  - ➢ Hydrogen oxide, nitrogen oxides, methane, hydrogen gas, chlorine monoxide are some of the natural causes.
  - ➢ Any human activity that leads to release of chlorine atoms in the atmosphere can cause ozone destruction in the stratosphere very efficiently.
  - ➢ Chlorine atoms rapidly destroy ozone. Destruction of ozone causes a thin spot or the ozone hole
- **Effects of Ozone layer depletion**



- UV rays are known mutagens and cause DNA mutations. So excessive radiations are not only harmful to human beings but are also harmful to all living organisms



- **Preventive measures**
  - ➢ Global awareness and action on the part of world community in the form of **Helsinki convention (1989), Montreal protocol (1990's)** have had some successful impact on this front.
  - ➢ A complete ban on CFCs and other such chemicals is recommended.
  - ➢ Use of HCFCs recommended as a temporary substitute for CFCs as they are relatively less harmful on ozone layer but not completely safe.
- **Desertification** means destruction or diminution of the biological potential of the land which becomes drier and drier, ultimately leads to the formation of deserts.
- **Desertification caused by physical factors**
  - ➢ Climate change
  - ➢ Soil erosion---exposed soil is easily removed by wind or water
  - ➢ Changing rainfall pattern---intense rainfall causes soil erosion
  - ➢ Drought
- **Human factors**
  - ➢ **Overpopulation:** More people mean more food; puts pressure on land.
  - ➢ **Deforestation:** Gives rise to erosion
  - ➢ **Farming practices:** Over cultivation; grow too much without replenishing the soil, it becomes exhausted

- ➢ **Overgrazing:** Can destroy vegetation.
- ➢ **Salting due to irrigation**: Irrigated water brings dissolved salts in it. Accumulation of excessive dissolved salts in soil makes the soil unfit for agriculture.
- ➢ **Stripping the land of natural resources.**

- **Acid rain** is the deposition of acidic components in rain, fog, mist, snow or dry particles, caused by atmospheric pollution.
- Acid precipitation is more acidic than normal---having a pH lower than 5.6, could be as low as 4 or below
- Acid rain is a mixture of nitric acid and sulphuric acid
- Natural sources of acid rain are volcanoes and lightening while Man Made Causes of Acid Rain includes burning of coal, natural gas, and oil in industrial processes, automobiles and power plants
- **Effects of Acid Rain**
  - ➢ Damages terrestrial and aquatic vegetation
  - ➢ Depletes the fertility of soil and soil microbial activity
  - ➢ Causes respiratory problems to humans and animals
  - ➢ Destroys marine life
  - ➢ Discolors and destroys buildings and statues, sculptures, fabrics, paper etc.

- **Strategies to cope up with acid rain**
  - ➢ Increase the use of natural gas and renewable resources and reduce the use of coal
  - ➢ Use low sulphur fuel/use washed coal
  - ➢ Use alternate energy source like solar, wind, geothermal, electric etc.
  - ➢ Accidental discharge of petroleum in oceans or estuaries is called oil spill.
  - ➢ Causes of oil spills
  - ➢ Effects of oil spills
- **Causes of oil spill**
  - ➢ Oil drilling operation
  - ➢ Capsized tankers
  - ➢ Offshore oil mining
  - ➢ Oil refinery
- It forms a thick layer called slick, which floats on the surface of sea and effects oceanic ecosystem.
- Extremely harmful to coral reef.
- Damages the marine biodiversity.
- Nuclear energy offers an alternative to many of environmental and social problems. But it also introduces serious problems of its own.
- Nuclear plants pose potential danger of accidents that may release hazardous radioactive materials into the environment.
- The problems are two folds 1) nuclear disaster and fallout 2) safe disposal of nuclear waste generated by nuclear plants.
- The detrimental effects of nuclear leakage could be **quick or slow.**
- Any substance that is present/ released in/into the environment causing substantial damage to public health and welfare of the environment. It is called very hazardous substance.
- When it could cause serious health effects from a single exposure. Thus the waste that contains such substances is called hazardous wastes

Check Yourself

1. Gases includes in Green House Gases are:
   a. CO, N2, NH_3, CFC
   b. CO_2, NO, NO_2, NH_3
   c. CO_2, CO, CH_2, NH_4
   d. CFCs, CO_2, CH_2, NO_3
2. Montreal protocol refers to:
   a. Global warming and climate change
   b. Ozone layer depletion
   c. Acid rain
   d. Organic pollutant
3. Acid rain is causes due to an increase in the concentration of:
   a. SO_2 and NO_2
   b. CO_2 and CO
   c. CH_4 and NH_4
   d. CO_2 and SO_2
4. In Nov, 1995, major nuclear disaster occurred in---------:
   a. Monjo, Japan
   b. Chalk River, Toranto, Canada
   c. 3 Mile Island, America
   d. Kiew, Chernobyl, USSR
5. What is not the source of sulphur oxides-
   a. Industrial sources
   b. volcanoes
   c. Paddy Field
   d. Oceans

Ans: 1.d 2. a. 3.a 4. a. 5. c.

Stretch Yourself

1. Name main green house gases
2. Mention main causes of desertification.
3. Name any two harmful effect of ozone layer on plants.
4. How does acid rain affect monuments and buildings.
5. What are the causes of oil spill.

Test Yourself

1. Destruction of biological potential of the land ultimately leading to the form of a desert. Explain.
2. Discuss about the impact of green house gases emission in the environment.
3. Explain causes of biodiversity loss.
4. What will happen if there is noCO2 in earth's atmosphere. Give reason in support of your answer.
5. How does acid rain affect monuments and building.