Chapter - 12

Environmental Problems and Solution

Meaning of Environment

The word environment is derived from ancient french word ***Environner*** meaning to encircle or the "outer covering" ie. the natural, physical and social covering that surrounds us is called environment.

The surrounding or conditions in which living beings live is known as their environment. Environment provides basic facilities for living beings to live. Basic facilities like Air, Water, Food and Shelter along with temperature, light or humidity etc are present naturally in the environment. For example, oxygen to breathe and clean water to drink are present on earth since time immemorial.

Natural resources have always been the basis of human development, but since last 200 years, over exploitation of natural resources due to increasing population pressure have played havoc on their nature and existence. Environment affects man and man is affected by environment.

Definitions

According to C.C. Park, "The term environment refers to the sum total of conditions which surround man at a given point in space and time."

According to Boring, "A person's environment consists of the sum total of the stimulation which he receives from his conception till death."

On the basis of above definitions it can be said that environment is not the name of any one factor but all the conditions or factors combined together, which affects the human life and development directly or indirectly.

Environmental Problems

There has been a close relationship between humans and nature since it's inception. With the origin of humans on earth, his requirements also originated. The life of early humans was fully dependent on nature. Humans have developed many industries for their physical well being. Due to growth of population, the number of villages, towns and metropolis has increased.

Since the origin of the whole human society to 1950 whatever utilisation (degradation) of nature was done, that much natural resources were utilised by United States of America alone in just 50 years ie. from 1950 to 2000.

Instead of maintaining a harmony with the nature the human society has started overruling the nature. As a result, the relationship between the two has started to worsen. Man's perception of consumerism and exploitation of nature has now emerged as a disastrous complication for his life.

The incidences of natural disasters such as earthquake, volcanic erruptions, excess rainfall, very low rainfall, drought etc. are increasing, due to increased imbalance between man and

environment.

Not only this, there are many more types of dangers hitting human life. The increasing pressure on food chain, partial changes in the weather system, changes in crop cycle, acid rain, green house effect, ozone layer depletion, barren land, pollution, spread of deserts etc environmental and associated problems are ready to end human civilization. Almost the whole world is struggling with these problems and is measures to escape from these are been searched.

In this chapter, we will study important aspects of environmental problems such as environmental pollution, acid rain, ozone layer depletion, green house effect etc.

Environmental Pollution

Along with the development of human civilization his requirements also extended. To meet the rapidly increasing requirements, man started exploiting natural resources. Aided by weapons like industrial and technological development, man pressurised by population and with his selfish nature, exploited natural resources in an uncontrolled manner. Industrial areas, developed with every big city and due to increase in the waste material excreted, a new problem known as environmental pollution originated.

Today, environmental pollution is not only a regional or a national problem but it has become a global issue. In metropolitans of many developing and developed countries fresh air and clean drinking water has become a major issue of concern.

Meaning and Definition of Environmental Pollution

The word pollution is derived from latin word ***Pollutus*** which means to make unclean. " Any undesirable change in physical, chemical and biological properties of air, water and soil, which adversely affects the elements of natural and cultural environment including humans, is called pollution." **E.P. Odum**

According to National Science Academy of U.S.A.," Undesired changes in physical, chemical and biological properties of Air, Water and Earth which affects human, other animals and destroys natural resources is called pollution."

According to National Pollution Research Committee," The negative change in physical, chemical and biological properties of Air, Water and Earth is called pollution."

Such an undesirable substances that changes any basic element of environment by it's presence or spreads pollution are known as ***pollutants***. Pollution besides being harmful for all types of organisms, it also brings huge losses to the abiotic resources.

Types of Pollution

The living composite area of atmosphere, lithosphere and hydrosphere is called as Biosphere. All natural elements available in this biosphere are termed as natural environment. Pollutants made from all types of activities practised by man have affected all these parts of the biosphere. On the basis of nature of pollutants, pollution may be understood in different types-

(i) Air pollution
(ii) Water pollution
(iii) Noise pollution
(iv) Soil pollution (Land Pollution)
(v) Vehicle pollution
(vi) Radioactive pollution
(vii) Thermal pollution
(viii) Industrial pollution
(ix) Garbage pollution
(x) Marine pollution
(xi) Pollution due to domestic residual / waste
(xii) Pollution due to other reasons

(i) Air Pollution

Air is essential for all living organisms,

Fig. 12.1 : Air, Land, Water & Noise Pollution by an Industrial Unit

without it life is impossible. All the gases found in atmosphere are in a definite proportion such as Nitrogen is 78.08 %, Oxygen is 20.94 %, Argon is 0.93 %, Carbon dioxide is 0.03 % and other gases are 0.02 %. Any slight change in this proportion affects the whole arrangement of atmosphere. Living beings are affected either directly or indirectly by these changes.

Air pollution is divided in two parts on the basis of sources -

(a) Natural pollution

(b) Unnatural (man made) pollution

(a) Natural pollution : It is caused by nature. Pollution occurs due to natural processes such as volcanic eruptions, dust storms, tornadoes, forest fire, mountain degradation etc.

(b) Unnatural (man made) pollution : Man himself brings the biggest contribution to air pollution. Maximum pollution occurs due to use of wood as fuel for domestic purpose, industries, means of transportation, smoking, using chemicals, radio-activity etc.

Disadvantages of Air Pollution

(i) It brings adverse effect to human health.

(ii) It brings adverse effect to vegetation. The existence of animal kingdom and insects is endangered.

(iii) Adverse effect over climate and atmospheric conditions, climatic changes, depletion of the ozone layer, green house effect, effects on weather.

(iv) Formation of fog domes over cities and metropolitans.

China Red Alert Issued : For the second time in a year, on 30 November 2015, China was under dense fog cover. Near about 5 lakhs 30 thousand square kilometres area of 23 cities went under dense fog cover. China had to issue a Red Alert. Under this, production in industrial plants was reduced or completely stopped, logistics through road was seized, movement of trucks was stopped, traffic on more than 200 highways in China was brought to a standstill.

To conclude, we can say that Air Pollution is a slow poison which affects whole living- non living kingdom of environment gradually. If this problem is not solved in due course of time then it will lead to destruction of the whole world. It is not a problem of any person, society, religion or country, and moreover resources are not possessed by any one individual, so neutralization is possible only through public awareness and public participation.

Fig. 12.2 (a) : Air Pollution by vehicles

Fig. 12.2 (b) : Air Pollution by industrial units

Measures to control Air pollution

Two dimensional policy has to be adopted to control air pollution. New technology is to be developed and utilized to control the previously done environmental pollution and prevent future pollution.

(i) Plantation is needed for controlling pollution, at least 33 % of the area should be under forest cover. Green belt has to be developed near villages and cities. Various social organizations, governments and people are coming forward for this cause.

(ii) The vehicle pollution should be controlled. Using solar energy, battery operated appliances and electric engines must be used instead of Petrol and Diesel.

(iii) Non- smoking stoves should be used. Trees should not be cut down.

(iv) Industries such as brick kilns and making utensils by pottery should be set outside cities.

(v) Innovative technology of industry should be used and industries must be established outside cities.

- On 24th June 2016, the central government drafted National Forest Policy under which the green tax was proposed. Greenry will be developed by using this money.
- Central government is making efforts to control pollution on roads by Green Highway policy 2015. But, complete freedom from this is possible only when each individual understands his role personally by planting a tree and by striving for its existence.
- Government of India is providing BS-4 grade fuel (petrol) to prevent the pollution since 1 April 2017, as previously BS-3 grade fuel was being given. From 1 April 2020, BS-5 grade fuel will be supplied.

(ii) Water Pollution

Undesirable changes in physical, chemical and biological properties of water which adversely affect humans and all other living beings is called Water Pollution.

Water pollution is change in chemical, physical and biological specifications due to decline in quality of water by human activities.

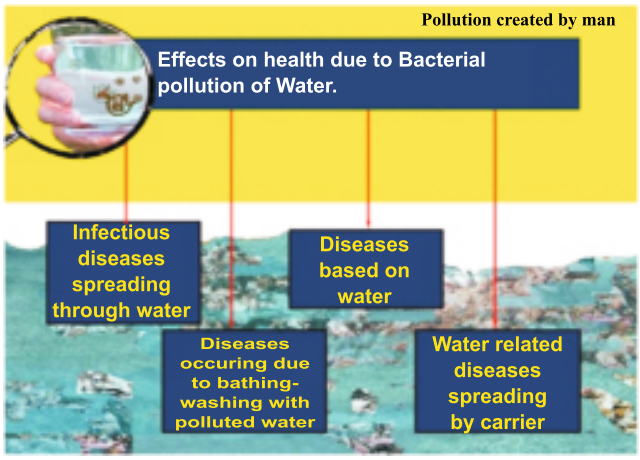
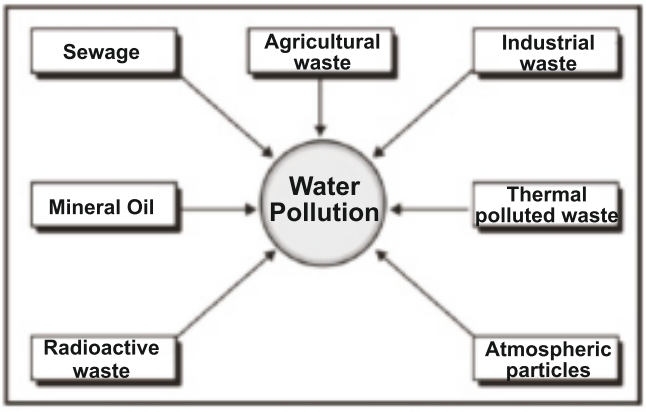


Fig. 12.3 : Effects of water pollution

Along with poisonous substances, number of disease causing bacteria and viruses increase in polluted water. This brings death of aquatic creatures and diseases like cholera, jaundice and other stomach related complications in man. It is considered that almost two-third of all the diseases found in humans in India occur due to water pollution.



Diagrame 12.3 : Sources of water pollution

Fig. 12.4 : Water pollution in river Yamuna

Development of cities, rapid industrialization, versatile use of atomic power, extensive spread in use of chemical and oily materials are polluting rivers and lakes. According to an estimate near about 3000 crore to 4000 crore litres of sewage excreted from 300 cities / towns is drained in rivers and drains daily. This has caused water pollution in rivers and lakes to its highest levels.

Even water from holy rivers like Ganges and Yamuna is not worthy enough to use.

According to a report from UNO, 2300 people are dying daily due to lack of safe drinking water and diarrhoea. Nearly 40 % of aquatic creatures have reduced in the last 30 to 40 years due to water pollution.

For instance, in Kanpur city in India water utilized for refining leather flows in river Yamuna. As a result, the water of river Yamuna is not suitable for use in daily life. (Fig.12.4)

Measures to Control Water pollution

(i) Sewage water treatment plants should be established for disposal of waste water in all the towns.

(ii) Instead of chemical farming, organic farming should be encouraged.

(iii) Water having industrial waste should be treated and should be used again in the industry.

(iv) Immersion of dead bodies of animals should completely banned. Electric crematoriums should be established.

- 300 Namaami Gange project launched : For the success of Namaami Gange Project 300 projects were started simultaneously on the banks of river Ganges on 7 July 2016. This project includes modernization of docks (Ghats) along with tree plantation on both sides of river Ganges.

(iii) Noise Pollution

When the intensity and frequency of the sound exceeds the audible level then it is termed as noise. The state of discomfort and restlessness in humans caused by unwanted high intensity sound is known as noise pollution. Due to increasing industrialisation, urbanisation, means of transportation and use of loud speakers, noise

pollution has become a major problem. Noise pollution is at higher levels in India compared to other countries.

The intensity and frequency of sound is measured to study the effects and control of sound pollution. Unit to measure Intensity of sound is decibel (dB). The sound above 80-120 dB comes under sound pollution.

When the intensity of sound crosses a certain limit which have an adverse effect on mental and physical health of an individual or group then it is called noise pollution.

Sources of Noise Pollution

Noise pollution is caused due to the means of transportation, use of loudspeakers, industrial noise, noise due to aeroplanes and jet planes.

Harmful Effects of Noise Pollution

It has an adverse effect on human brain which lead to irritation and hearing impairment, A sudden loud noise close to the ear can result in permanent hearing loss due to which man starts behaving abnormally.

(iv) Land Pollution

The degradation or loss of soil quality due to natural and human activities is known as land (soil) pollution. Soil pollution results into lowering of soil fertility. It has an adverse effect on all the living organisms of this universe.

Main Causes of Land Pollution

It is caused by polluted water, excessive use of chemical fertilizers, industrial effluents and urban wastes. For example, in Punjab the excess use of chemical fertilizers has created a big challenge before the people of Punjab. In the same way, in China the rapid growth of industries has created the problem of water pollution which affected the land in nearby areas. It can be seen as soil pollution.

Harmful effects of Soil Pollution

(i) Cultivable land is decreasing day by day.

(ii) The diseases caused by land pollution are diarrhea, cholera, dysentery, problems related to eye and tuberculosis.

(iii) Land pollution is the mother of all other pollutions.

(iv) The problem of availability of land has increased due to land pollution.

Fig. 12.5 (a) : Land pollution

Fig. 12.5 (b) : Land & Air pollution

Acid Rain

Acid rain is caused by emissions of carbon di-oxide, sulphur di-oxide and nitrogen oxide from different production process of various industries, which react with the water molecules in atmosphere to produce acids. The rain that is usually acidic is known as acid rain.

Generally, 60 - 90% acid rain occurs due to H_2SO_4 and 30 - 40% is due to the presence of HNO_3 in the atmosphere.

$SO_2 + H_2O \rightarrow H_2SO_4$ (Sulphuric Acid)

$NO_2 + H_2O \rightarrow HNO_3$ (Nitric Acid)

The pH value of acid rain is between 5 to 2.5, The pH value of 7 denotes neutral character of substance. If pH value of a substance is less than 7 then it is acidic in nature whereas if it is more than 7, the substance is alkaline. The level of Hydrogen ions increases during acid rain.

Causes of Acid Rain

The main source of acid rain is presence of NO_2, SO_2, NO, CO_2 gases in atmosphere. H_2SO_4 formed by the chemical reactions of SO_2.

The sources of SO_2 are :-

(1) It forms in the environment due to automobile or coal or thermal power plants.

(2) Huge quantity of coal is burnt in thermal power plants for producing electricity.

(3) Petroleum refineries.

(4) Automatic vehicles.

(5) Burning fossil fuels.

Acid Rain

Rainfall in which SO_2, oxides of Nitrogen, Chlorine and CO_2 etc are found in a soluble state.

- It influences the ovulation in fishes.
- Water of less than 5 pH value can lead to death of a mature fish.
- Acid rain has destroyed some species of insects and fishes.
- It kills micro organisms found in soil and changes the chemical composition of soil.

Acid Rain

Rainfall in which SO_2 and oxides of Nitrogen is found in a soluble state.

- The forests found at higher altitude are affected by acid rain because they are surrounded by fog and clouds which are more acidic than acid rain.
- It destroys the buildings and historical monuments. The sulphuric acid present in acid rain reacts with calcium compounds of limestone, sandstone, marble and granite and produces gypsum which is removed in the form of a incrustation.

Effects of Acid Rain

The productivity of soil decreases. Due to high acidity, minerals and nutrients of soil are lost.

(i) The adverse effects of acid rain are not confined to a particular area and not even to the industrial and vehicular sources which emit SO_2 and NO_2 because the factors responsible for acid rain are carried in the atmosphere by winds and spread over large areas thousands of kilometre away from the source.

(ii) It leads to pollution of drinking water sources. Humans face problems of breathing, skin and irritation in eyes due to acid rain.

(iii) Acid rain adversely affects forests. A layer of wax spread on the surface of leaves which lead to closing of stomata. Due to this, organic processes like photosynthesis, growth, procreation, evapo-transpiration etc. slows down. About 8% forests in Germany are destroyed due to acid rain.

(iv) The increase of acidity of water in water sources like lake, river etc. have adverse effect on aquatic animals and vegetation. The biotic components in most of the lakes of America, Norway and Sweden etc. are destroyed due to acid rain.

(v) Due to acid rain, soil acidity increases which have harmful effect on plant and animal kingdom. Organic processes also get degraded.

(vi) It damages buildings due to corrosion. Sandstone and marble are affected the most. The marble statue in Greece, Italy and many other European countries and famous Taj Mahal of Agra decoloured due acid rain.

Possible Solutions

Acid rain is one of the largest environmental problems as it may occur in distant areas away from polluted areas. Man made production processes are mainly responsible for acid rain.

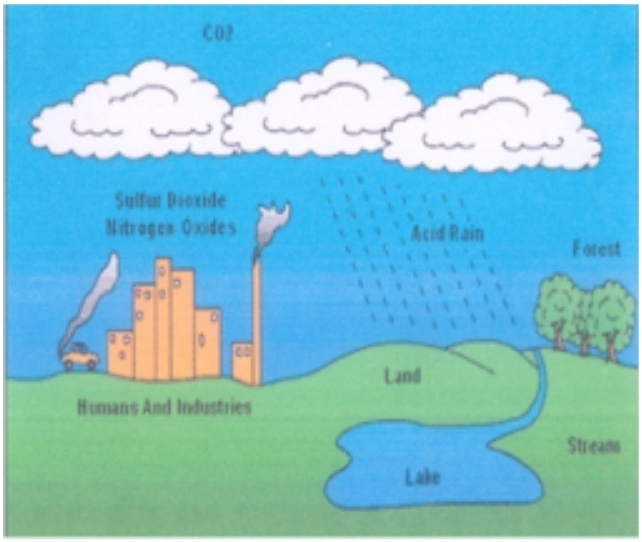
(i) The production of SO_2 and NO_2 should be controlled at source. They should not be allowed to intermix in atmosphere. So, scrubbers should be used in industries. Bag filter and colloidal tanks should be used.

(ii) Solar energy and wind energy should be promoted.

(iii) Use of private personal vehicles should be minimised. Time to time vehicles should be checked for pollution.

(iv) Water resources, where acidity in water has increased, lime should be added to the water. In the same way, lime must be used to reduce soil acidity.

In most of towns in India, the level of acidity in rain water is below the safety level. But we have to have effective control over the industrial units which increases the concentration of harmful gases in the environment.



Diagrame 12.6 : Acid Rain

Green House Effect

Green house effect is a naturally occurring phenomenon (natural process) by which some gases present in the atmosphere of a planet or satellite help in increasing the temperature. These green house gases include carbon dioxide, water vapour, nitrogen dioxide, methane etc. Normally, carbon dioxide allows solar radiation to reach earth's surface and also allows terrestrial radiations to escape to space. But due to increase in this gas, some part of terrestrial radiation is absorbed by the atmosphere green house gases and re-radiated in all directions, some to space and some back towards the surface, where it further warms (increase in temperature) the surface and the lower atmosphere. This is known as Green House Effect.

Green house effect leads to the problem of global warming because solar radiation is absorbed in earth's atmosphere but it is not radiated back to space.

Causes of Green House Effect

(1) Industrialization : Due to burning of coal, petroleum in industries.

(2) Deforestation : Carbon di-oxide is a very useful gas as it is essential for process of photo-synthesis in plants. But forest area is diminishing due to cutting down of trees continuously. This leads to increase in atmospheric CO_2. Increase in CO_2 is harmful.

(3) Combustion of fossil fuel : About 80 % CO_2 is released in atmosphere due to combustion of fossil fuels. The amount of CO_2 increased from 290 ppm to 330 ppm due to deforestation and use of fossil fuels.

(4) Use of Refrigerators and Air conditioners : manufacturing and use of refrigerators and air conditioners CFC's (chlorofluro carbons) is released which further increases the green house effect.

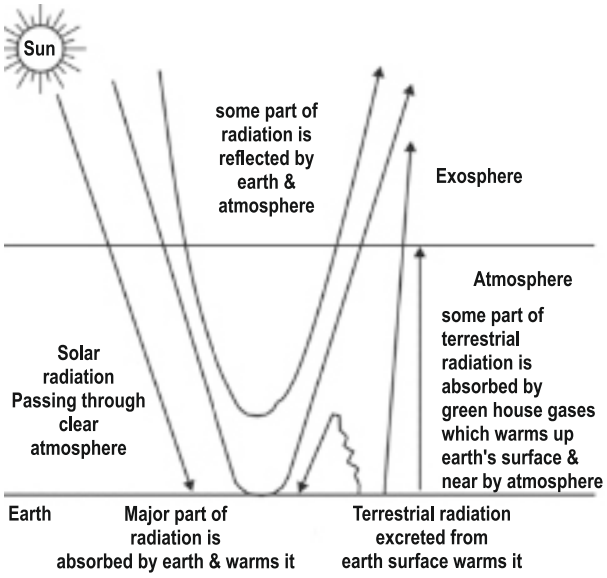


Fig. 12.6 : Green House Effect

Fig. 12.7 : Thermal Power Plant

Effects

In the last 100 years, a substantial increase in Methane and Nitrous Oxide gases is recorded. The concentration of CO_2 has increased by 30 %. The amount of Methane has increased by almost 145 % from the days of industrial revolution to present. This leads to green house effect and increase in earth's temperature. The main effects of this are

(1) Increase in temperature : The earth's average annual temperature has recorded an increase. It is believed that if the green house gases are not reduced than the chances of survival of trees will be less due to lack of sun's bright light and lack of oxygen.

(2) Increase in rainfall : The cycle of rainfall will change. The amount of rainfall will increase. This will lead to desertification in some countries.

(3) Rise in Sea level : Due to rise in atmospheric temperature by 0.5^0C 1.5^0C, glaciers and polar ice caps will melt, coastal areas will be flooded. Most probably, some islands will submerge under water. The level of sea will rise.

(4) Change in vegetative regions : The boundaries of grasslands and forested areas will change. There can be drought / famine in sandy areas of Africa.

(5) Spread of diseases : There can be change in the insect types with change in vegetative regions, which will lead to spread of diseases unknown to that region. With the increase of 3^0 - 5^0 C in global temperatures, the cases of malaria will increase by 40 - 60 %.

(6) Danger to bio-diversity : Due to rise in temperature, danger to 80 % of the bio-diversity will increase.

- Area affected by Global Warming : The global warming is affecting six countries including India. These countries are Nepal, Maldives, Bangladesh, Bhutan, Pakistan and Sri Lanka whose two billion population is affected by global warming.
- Scientists have identified nine regions where climate change can be seen. India is one of them. There will be change and affect on weather cycle which can lead to food scarcity.
- The maximum danger of global warming will be in countries like China and India. Decrease in wheat production can be seen in India. It is due to global warming. The size of wheat seed do not develop properly due to sudden increase in temperature. It may lead to 3 to 4 % decrease in production.
- If there is an increase of 1 metre in sea level then 576.40 lakh hectare land will be submerged under water. Due to this about 71

lakh people would be displaced. Mumbai, Kolkata, Vishakhapattnam, many islands and 17 % of Bangladesh would be submerged under sea water which would create many problems.

- It would create danger to 80 % of bio-diversity. The glaciers are receding at(1.7 m per year) a faster rate. The Gangotri glacier of India has receded 23 metres from its original place. China is contributing the most in pollution in the world. From the point of emission of green house gases, India stands at fourth place.

Measures to Decrease the Effect of Green House Gases

Possible Remedies

(1) Reduction (Drastic Cut) in the use of fossil fuels.

(2) Afforestation and reforestation on a large scale should be done because plants consume carbon dioxide during the process of photosynthesis and release oxygen and in this way maintains balance in the levels of carbon dioxide in the atmosphere.

(3) Ban the use of CFC's Chloro Fluro Carbons remain in atmosphere for years. Hence, the use of gadgets emitting CFC's should be banned.

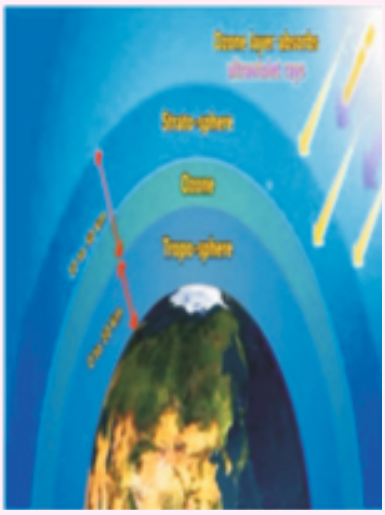
Ozone Layer Depletion

The ozone layer is mainly found in the lower part of the stratosphere between 15 to 35 kms above mean sea level. Ozone gas is concentrated here. This gas acts as a shield and do not allow high energy ultra-violet rays of the sun to reach earth surface.

The decrease in the concentration of ozone gas in the ozone layer over a large area is known as Ozone layer depletion or Ozone hole.

After the1970's decade, there is decrease (about 4 % per decade) of ozone is seen in the stratosphere and during this same duration, there is a seasonal decrease of stratospheric ozone in polar regions of the earth. This is known as Ozone hole.

Ozone Layer



- Ozone layer is found in the lower stratosphere between 15 - 35 kms.
- In the last 50 years, man has destroyed the natural balance by releasing harmful chemicals in the atmosphere which led to the depletion of this life saving shield.
- Oxford scientist G M B Dobson made a machine to monitor ozone in 1920's decade.

Depletion of Ozone Layer

- According to the studies on ozone layer done by scientists in the last few decades, the level of atmospheric ozone is decreasing slowly.
- The depletion of ozone layer was first detected in 1980's. Scientists explored that there is a ozone hole over Antarctica and ozone is decreasing at 0.5 % per year.
- In another study, it is revealed that there is a decrease of 20 - 30 % ozone over Antarctica.
- Depletion of ozone layer is also noticed over Australia and New Zealand.
- With time, ozone holes can be seen over North Pole during spring season.

Causes of Ozone Layer Depletion

The main culprits of destruction and depletion of ozone gas are halogenic gases, Chloro-Fluro-Carbon, Bromine, Methyle Chloroform and Carbon Tetrachloride etc.

The free chlorine is responsible for ozone depletion in stratosphere. One molecule of chlorine destroys 100000 molecules of ozone. Chlorine molecules are formed by disintegration of CFC's.

Increase in CFC's and halons lead to increase in depletion of ozone.

$$CFCl_3 + h\nu \rightarrow CFCl_2 + Cl$$

The molecules of Chlorine and bromine react with ozone and destroy it. e.g. one chlorine molecule reacts with one molecule of ozone and forms ClO. ClO reacts again with O_3 and forms free chlorine.

$$Cl + O_3 \rightarrow ClO + O_2$$

$$ClO + O_3 \rightarrow Cl + O_2$$

This, in totality leads to depletion of ozone in the lower part of stratosphere.

Effects of Ozone Layer Depletion

(i) Depletion of ozone layer can cause skin cancer and cataract (eye disease)

(ii) Phytoplanktons are destroyed due to ultra-violet rays which have an adverse impact on marine food chain.

(iii) It causes decrease in the production and quality of many crops.

(iv) Ultra- violet rays adversely affect our immune system.

(v) Ozone depletion will lead to increase of temperature in equatorial region. This will lead to retardation of mental and physiological development of people.

Depletion of Ozone Layer A Danger

- We cannot live without ozone layer because ultra-violet rays would cause cancer, destruction of crops and endanger the marine life.
- Another danger is of melting of Polar ice.
- There is a large ozone hole over Antarctica.
- If ice cap in Antarctica melts, then there will be danger of flooding of coastal areas.
- It will also lead to increase in global temperature.

Efforts to protect Ozone layer

(i) A seminar was organized on Ozone Layer Safety in London on 2 March 1990.

(ii) Montreal Protocol was adopted which lead to banning of the production of CFC's and halon and other ozone depleting chemicals such as tetra chloride, trichloroethane.

(iii) Ban on the most dangerous CFC- Freon which is used in refrigerator, air conditioner, foam used in sofa and aerosol sprays.

(iv) Ban on concord aircraft of America (because it was thought that it may lead to depletion of ozone layer due to its very high speed and sound).

(v) Celebrating 16 September every year as International Ozone Layer Day at national and state level which will make public aware of this problem through seminars and workshops.

International Efforts to Save Environment and Earth

Many conferences are organised with the combined efforts of various countries and United Nations Organisation to conserve the quality of environment and to keep ecological balance and bio-diversity.

- **Stockholm Summit :** It was started in Stockholm city of Sweden on 5 June 1972. The main issue was to save world environment. After this summit, 5th June was declared as 'World Environment Day'. 25 point programme manifesto was prepared to solve environmental problems.
- **Cocoyoc Declaration :** It was organised in Cocoyoc city of Mexico in 1974. It attempted to redefine the aims of development.
- **World Climate Summit (1979):** It was the first World Climate Summit held at Geneva, Switzerland.

World Environment Summits

S. No.	Name of Place	Country	Year	Main topic discussed in conference
1	Stockholm Summit	Sweden	1972	25 point programme to save environment.
2	Cocoyoc Declaration	Mexico	1974	Redefining the aims of development.
3	Desert Summit Nairoby	Kenya	1977	-
4	Vienna Convention	Austria	1985	Protection of Ozone layer.
5	Montreal Protocol	Canada	1987	To reduce emission of harmful gases.
6	Toronto Summit	Canada	1988	To reduce emission of green house gases.
7	Hague Declaration	Netherland	1989	Discussion on maintaining quality of environment.
8	Earth Summit (Rio-De-Janeiro)	Brazil	June 1992	World environment fund was created.
9	Newyork Conference	USA		Second earth summit.
10	Kyoto Protocol	Japan	1997	159 contries participated thurst on Kyoto protocol.
11	Bonn Convention	Germany	1998	Special action to be taken on global warming.
12	Johannesburg Summit	South Africa	2002	Special attention on sustainable development.
13	Durban Earth Summit	South Africa	2003	Special attention on protection of bio-diversity.
14	Stockholm Conference	Sweden	2004	Emphasis on reducing industrial polluton.
15	Montreal Summit	Canada	2005	To bring down the level of green house gases.
16	Nusa Dua, Bali	Indonesia	2007	IV report of IPCC was presented.
17	Poznan Conference, Warsaw	Poland		-
18	Copenhagen Summit	Denmark	2009	Year 2009 was declared as the hottest year.
19	Cancun	Mexico	2010	Agreement on investment on 100 billion dollars as green fund.
20	Nagoya Protocol	Japan	2010	India signed the agreement on bio-diversity & sustainable development.
21	Durban Summit	South Africa	2011	17th Climate Conference.
22	Doha Conference	Qatar	2012	UN Green Climate Fund.
23	Minimata Summit, Kuomoti City	Japan	2012	First summit to ban mercury 2013.
24	Warsaw Summit	Poland	2013	Emphasis on agreement on climate change.
25	Leema Summit (G-20)	Peru	2015	Main issues were climate change and terrorism.
26	UN Conference on Climate Change, Paris	France	12 Dec. 2015	Sustainable development of agriculture and transportation.
27	World Earth Summit, Newyork	USA	22 April 2016	Signed treaty on climate change in Paris.

- **Vienna Convention (1985):** This was organised in Vienna, Austria for the protection of ozone layer.
- **Montreal Protocol :** Thirty three countries signed Montreal Agreement under United Nations Environment Programme in 1987, in which agreement was on to decrease the production of CFC's and other harmful gases, to conserve ozone layer. The developing countries were given ten years extra time to do this.
- **Toronto Summit (1988):** Held at Toronto city of Canada in June 1988, for the reduction of green gases to save the world from the dangerous results of climatic change. The developed countries were requested for 20 % cut in emission of Chlorofluro carbons by 2005 voluntarily.
- **Helsinki Declaration :** on 2nd May, 1989 at Helsinki, to reduce emission and use of chlorofluro carbons to save ozone layer from further depletion.
- **Earth Summit :** The first Earth Summit organised from 3 14 June 1992 in Rio-de-Janerio of Brazil. It was organised under the aegis of United Nations as United Nations Conference on Environment and Development (UNEP). The conference was attended by the representatives of 178 countries. The agenda of the conference were (i) to tackle the problems of global warming (ii) forest protection (iii) bio-diversity and (iv) Rio declaration and Agenda 21. These objectives were to arrive at commonly acceptable agreements and their implementation among different nations to restore the integrity and quality of eco system, conservation and safety of environment. It talked of sustainable development- A method of economic development without jeopardising environment. World Environment Aid Fund was created which will help in the following works (1) to tackle global warming (reducing the emission of green house gases) (2) to conserve bio-diversity (3) to protect ozone layer or to control water pollution of international water resources. The establishment of 'World Environment Fund' was thurst upon to bear the expenditure on bio-diversity conservation.
- **Kyoto Protocol :** A summit was held from 1 11 December, 1997 in Kyoto, Japan which is known as World Environment Conference, Green House Conference and Kyoto Protocol. This summit was attended by the representatives of 159 countries. India signed it in 2002. To tackle the problem of global warming, a proposal tocut the emission of six green house gases responsible for global warming (Carbon dioxide, Methane, Hydrochlorocarbon, Nitrous oxides, Chlorofluro carbons and Sulphur hexa chloride) by 2008 2012 AD. An agreement was done on cut of 5 % in CO_2 emission from 1990 level. European Union (8 %), USA (7 %) and Japan (6 %) agreed to curtail the emission of carbon dioxide.
- **Johannesburg Summit :** It was organised at Johannesburg (South Africa) from 26th August to 4th September 2002. It is also known as Plus 10 Conference. It was also an earth summit. The main objective of the conference was global warming. While addressing the conference Prime Minister Shri Atal Bihari Vajpayee said " We should develop but this development is to be sustainable and economic development should not lead to destruction of human civilisation."
- **Nusa Dua (2007) :** It was held at Nusa Dua city of Bali Island, Indonesia in 2007 in which IV report of IPCC was presented. IPCC (Inter Governmental Panel on Climatic Change) is a body of UN. The head of IPCC is elected through democratic process. Rajendra

Pachori, a person of Indian origin, was elected as head of IPCC. Pachori prepared a report on effects of green house gases on earth. This report of UN was awarded Nobel prize in 2007 which was taken by Rajendra Pachori and American President.

- **Cancun (Mexico Summit) :** It was 16th UN climate conference from 29th November 2010 to 10th December 2010. An agreement to invest 100 billion dollar as Green Fund was reached.
- **Nagoya Protocol :** India signed the agreement on bio-diversity and sustainable development on 29th October 2010 at Nagoya city of Japan.
- **Doha Conference :** Held in November 2012 on climatic change UN Green Climate Fund was established on 18th November 2012, to smoothly run climate change related programmes in developing countries. It's headquarters is in Incheon city (Songara) South Korea.
- **Warsaw Summit :** Held on 11th to 22nd November 2013 at Warsaw city, Poland, agreement was signed on creation of Green Climate Fund and Climate Change.
- **World Earth Summit 2016 :** The whole world celebrated 46th World Earth Day on 22nd April 2016. The motto was 'Trees for the Earth'.

Main Days

• World Heritage Day	18 April
• World Earth Day	22 April USA 20 March UN
• World Bio-diversity Day	22 May
• World Population Day	11 July
• Hiroshima Day	6 August
• World Ozone Day	16 September
• Green Consumer Day	28 December
• Bhopal Gas Tragedy Day	2 December
• World Soil Day	5 December
• World Environment Day	5 June
• National Pollution Control Day	2 December

International Environmental Institutes

- UNEP United Nations Environment Program, Headquarter - Nairobi
- IUCN International Union for Conservation of Nature and Natural Resources, Headquarter - Switzerland
- TRAFFIC Trade Record Analysis of Flora and Fauna, It keeps control on illegal trade in Flora and Fauna
- WWF World Wild Fund for nature, Headquarter Glind, Switzerland and Emblem Red Panda
- IPCC Inter Government Panel on Climate Change

- **World Environment Day** is celebrated every year to spread awareness about conservation of earth in the world. More than 170 countries representatives signed the Paris Treaty on climate change in December, 2015 at UN headquarters, New York. This historical pact along with Agenda 2030 on sustainable development has the power to change the world.

Indian Institutes and Organisations

- **Botanical Survey of India** Office Kolkata, It is related to survey of plant resources.
- **The Wildlife Institute of India** Dehradun, Engaged in Research and Training.
- **Kalpvriksh** This NGO is engaged in conservation of bio-diversity and environment since 2003.
- **CAZRI (Central Arid Zone Research Institute)** Jodhpur
- **FRI (Forest Research Institute)** 1906, Dehradun

- **NEERI (National Environmental Engineering Research Institute)** Nagpur, 1958

IMPORTANT POINTS

1. Human life and his needs can only be fulfilled by environment.
2. The consumerism of man has created many problems before humans. If these problems are not solved now than the human civilisation will be destroyed.
3. Man made environmental problems are Pollution, Acid Rain, Green House Effect, Global Warming, Ozone Depletion.
4. An undesirable change in any element of environment which has an adverse effect on the living world is called pollution.
5. Types of Pollution Air Pollution, Water Pollution, Sound (Noise) Pollution, Soil and Land Pollution etc.
6. Green House is also known as glass house.
7. Causes of Green House Effect Use of coal and petroleum in industries, destruction of forests, exploitation of fossil fuels, use of refrigerators and air conditioners etc.

EXERCISE

Multiple Choice Type Questions

1. The pH value of acid rain water is -

(a) 5 to 2.5 (b) 5 to 7.5

(c) more than 7.5 (d) less than 2.5

2. Formula of acid rain is -

(a) $SO_2 + NO_2$ (b) H_2SO_4

(c) $NO_2 + SO_4$ (d) $HNO_3 + SO$

3. The layer of atmosphere which absorbs ultra-violet rays is -

(a) Troposphere (b) Ozone layer

(c) Ionosphere (d) Exosphere

4. Montreal Protocol 1987, emphasised on -

(a) Ozone layer (b) Bio-diversity

(c) Green House (d) Industrial Revolution

5. The first World Conference on climate was held in -

(a) Japan (b) Vienna

(c) Geneva (d) Canada

6. Earth Summit, 1992 was held at -

(a) Rio-de-Janerio (b) Geneva

(c) Switzerland (d) Copenhagen

7. The World Bio-diversity day is celebrated on -

(a) 5 June (b) 11 July

(c) 22 May (d) 11 September

Very Short Answer Type Questions

8. In which country is Kyoto situated?

9. Which decade is declared as the hottest decade?

10. Who was elected as the chairman of IPCC in Nusa Dua?

11. Where was the second Earth Summit held at?

12. In which summit Green Fund was established?

Short Answer Type Questions

13. Write any two causes of acid rain.

14. Write harmful effects of Green House effect.

15. Write measures to control Water Pollution.

16. What is China Red Alert?

Essay Type Questions

17. Write a note on Green House Effect.

18. Describe the causes, effects and possible solutions to acid rain.

19. Describe briefly, conferences / summits on World Environment.