

MODULE - 7

Humans and Environment



Notes



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HUMAN IMPACT ON ENVIRONMENT

While there are many reasons for appreciating nature's bounty, there are also reasons for expressing concern regarding environmental problems. Environmental problems arise both due to natural processes and human activities. These problems adversely affect human and other forms of life.

In this lesson, you will learn about some natural and man-made environmental problems, their causes, effects and control. We will first explain the issues related to human activities and then discuss the natural disasters. But even before that it would be worthwhile to consider how the growing population can affect the environment



OBJECTIVES

After completing this lesson, you will be able to:

- *express concern regarding environmental problems;*
- *categorise environmental problems into natural and human made and cite examples;*
- *state meaning of the term natural disaster and briefly explain some of them along with their management methods;*
- *establish relationship between large human population and its impact on the environment;*
- *define the term biodegradable and non-biodegradable wastes and suggest methods of waste management.*
- *discuss certain global environmental problems like ozone hole, global warming, photochemical smog and acid rain.*



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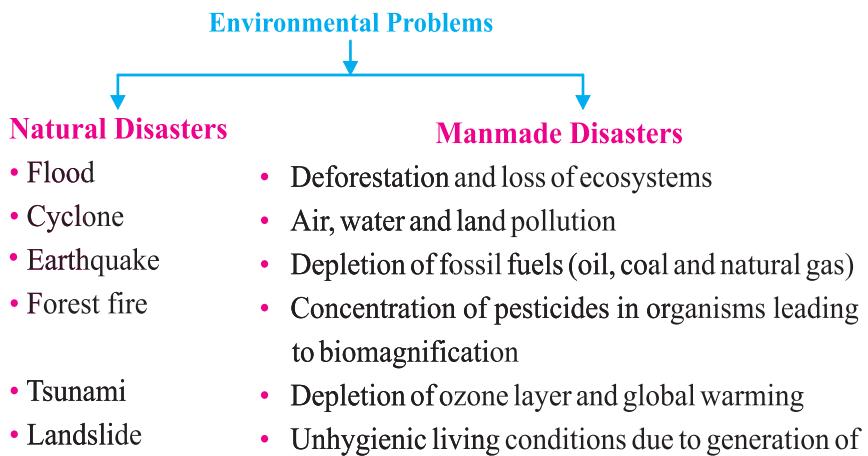
30.1 ENVIRONMENTAL PROBLEMS-CAUSE FOR CONCERN

You have already learnt about the natural environment and its components in the previous lesson. You must have realized the importance of maintaining a clean environment for supporting life. But developmental activities carried out by humans have degraded and polluted the environment. It has become necessary, therefore, to, keep a close watch on their impact on the environment. Human population of our country has crossed the one billion mark. The large population world over, technological advancement in recent years and lack of respect for our environment has added to the list of problems, especially pollution and depletion of natural resources.

Although natural phenomena such as earthquakes, floods, tsunami, cyclones and fires affect the environment on a large scale, nature has the capacity of recovering. It is however, high time that each citizen becomes aware of these issues in order to contribute towards saving the environment.

30.2 ENVIRONMENTAL PROBLEMS

Environmental problems may occur due to natural disasters and/or degradation caused by human activities. A disaster whether it is natural or manmade results in large scale damage to life and property. The effect of these disasters can be felt either locally or at the global level. They are categorized into natural and man-made environmental problems.



30.3 NATURAL DISASTERS AND THEIR IMPACT ON ENVIRONMENT



Do you know

Following are the Nodal agencies in the Government of India mandated for early warning of different natural hazards:



| Disasters | Agencies |
|-------------------|---|
| Cyclone | — Indian Meteorological Department |
| Tsunami | — Indian National Centre for Oceanic Information Services |
| Floods | — Central Water Commission |
| Landslides | — Geological Survey of India |
| Avalanches | — Snow and Avalanche Study Establishment |
| Heat & Cold Waves | — Indian Meteorological Department |

These agencies shall be responsible for keeping track of developments in respect of specific hazards assigned to them and inform the designated authorities/agencies at National, State and District levels about the impending disasters. All these agencies have developed guidelines for early warning of disasters.

Let us discuss some such disasters and their impact on humans and other living beings.

30.3.1 Floods

India being a country of many rivers and with tropical climate is one of the most flood-prone countries of the world. We regularly learn about the damage caused due to floods. Floods are frequent because most of the rivers are full of water during monsoons. Flooding is caused by the inadequate capacity within the banks of the rivers to contain the high flow of water due to heavy rainfall. Areas having poor drainage get flooded by accumulation of water. Do you know that even humans contribute to flooding by blocking the natural flow of a river?



Fig. 30.1 (a) Floods blocks roads



(b) Human lives and property affected by floods

Almost all Indian states have been affected by serious floods. Apart from loss of lives of humans and cattle, on an average, every year 75 lakh hectares of land area is affected by the floods annually, accompanied by damage to the crops, houses



and public utilities. Interestingly, while on one hand floods cause large scale losses on the other hand it helps agriculture by improving the soil quality.

Preventive Measures and Management

The following steps may be taken to prevent damage due to floods:

- No construction should be allowed in the river beds
- Timely cleaning and desilting of water channels and reservoirs by civic agencies;
- Safe disposal of surplus run-off water from river to river and drain to drain to ensure easy flow of water;
- Buildings like public institutes, schools, offices, telephone exchange, power supply stations, railway tracks and stations, roads and residential areas etc. need to be built above levels that correspond to floods occurring in the past few years;
- Constructing flood proof buildings;
- Local community as well as authorities needs to have a ready plan for evacuation. It is important to identify an evacuation center in the flood-prone area and give it publicity so that people can move there in emergency. Adequate supply of food and drinking water may also be considered;

Floods can also cause epidemics. Can you suggest any two possible way of preventing the epidemics? Yes you are right: 1. Drinking boiled water 2. Eating properly cooked food.

Epidemics: an outbreak of a contagious disease that spreads rapidly and widely

30.3.2 Cyclones

India has a long coastline, which is vulnerable to the tropical cyclones in the Bay of Bengal and the Arabian Sea. The Bay of Bengal region is frequently battered by storms and cyclones. Cyclones are intense low-pressure areas in the form of depressions or cyclone storms. Severe cyclones are associated with hurricane, winds etc.

There are two cyclone seasons in India, the pre-monsoon season (April-May) and the post-monsoon season (October-December). The states of Orissa, Andhra Pradesh, Tamil Nadu and West Bengal are the most affected states due to cyclones.

Balasore district in Orissa is the most vulnerable district for cyclone landfall. You would have heard about Orissa super cyclone that occurred in the state of Orissa on October 29, 1999 at a wind speed of 270-300 km per hour accompanied by heavy rains continuously for three days. The sea surged up to 7m high and sea



waves travelled up to 15-20 km in land. This resulted in heavy losses. The agriculture, livestock, infrastructure, industries and environment were badly devastated during this cyclone.



Fig.30.2 (a) Formation of a Cyclone (b) Cyclones disrupt coastal life and property

Preventive measure and management

Buildings are to be constructed keeping in mind cyclone safety measures. Decaying trees or any other loosely fixed objects and unsafe buildings need to be demolished;

Extra food and enough drinking water may be stored in advance;

Hurricane lantern filled with kerosene, and flashlights, matchbox, candles etc. should be kept ready;

In case of a cyclone, head for the proper shelter or evacuation point, keep calm and remain there until informed that you may return home. Neither panic nor lend an ear to rumours;

After the cyclone has passed get yourself inoculated against diseases and seek medical care for the injured and sick, clear the house and dwellings of debris and report any loss to the revenue authorities.

30.3.3 Earthquakes

Earthquake is a common phenomenon. It is the shaking, rolling or sudden shock of the earth's surface. We are aware of the serious damages caused by earthquakes to life and property, at Bhuj and Anjar near Ahmedabad and some other places in Gujarat on 26th January 2002. Earlier Latur in Maharashtra had also experienced a similar natural disaster on 30th September 1993. Most earthquakes pass unnoticed.

Most earthquakes pass unnoticed

Earthquakes of greater intensity shake buildings, and loosen the bricks. Falling of walls may injure people and property. Earthquakes also cause breakage of water pipes, cut electric lines, damage rail and road routes.



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The intensity of earthquake is related to the amount of energy released when rocks give way to the forces within the earth. It is measured with the help of an instrument known as **seismograph**. The intensity of an earthquake is measured on the **Richter scale** (invented by the scientist *C.F. Richter*).

Following values indicate the degree of damage.

| Intensity on Richter scale | Extent of Damage |
|----------------------------|-------------------------|
| Upto 3 | No damages |
| 5 | Cracks in old buildings |
| 7 | Cracks in roads |
| Above 8 | Falling of buildings |

Impact of a severe earthquake

Recently you have seen the devastation due to earthquake in Sikkim on 18th September, 2011 on your TV monitors or pictures in the print medium.

Most problems from an earthquake result due to falling objects and debris because of collapse of the building or ceiling plaster etc., and not due to the ground movement.



Fig. 30.3 Collapsing of buildings and build up debris

A severe earthquake damages roads, bridges, dams, fields and settlements or cause fires due to short-circuits or other means

Preventive measures and management

Modern earthquake-resistant architecture for the buildings, roads, dams, bridges, etc. may be adopted.

In the event of an earthquake stay as safe as possible. Be aware that some earthquakes are actually foreshocks and a larger earthquake might follow. Minimize your movements to a few steps to a nearby safe place and stay indoors until the shaking has stopped and you are sure exiting is safe.

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Stay away from glass, windows, outside doors and walls, electricity poles, trees and anything that could fall, such as lighting fixtures mirrors or furniture. If you are in a multi-storyed building stay on the same floor. Do not use elevators or run towards the staircase doors.

Can you suggest a reason as to why we should not use an elevator during an earthquake? You can take help of internet to answer this question. You can give your suggestions in the space provided below.

If travelling, stop the vehicle away from buildings, walls, slopes, trees, electricity poles and wires and move out in the open. Keep calm and stand under strong beams that may not fall or creep under the dining table or a strong bed.

If you are in a building and unable to move, cover your head and body with your arms, pillows or blankets to protect yourself from falling objects.

After an earthquake

Keep calm, switch on the radio/TV and obey any instructions you hear on it. Keep away from beaches and low banks of rivers. Huge waves may sweep in. Be prepared for aftershocks.

Immediately clean up any inflammable products that may have spilled (alcohol, paint, etc).

If you know that people have been buried, inform the rescue teams. Do not rush and do not worsen the situation of injured persons or your own situation.

Check for injuries. Apply first aid. Help others.

Check for fire and structural damage and clear blocked exits.



ACTIVITY 30.1

On 18th Sep 2011 there was a severe earthquake in Sikkim. Earthquake was also experienced in Delhi and NCR (National Capital Region) at the same time. Why is it that there was a loss of property, human lives, and biodiversity in Sikkim whereas no such damage was there in Delhi. Suggest any one reason for it in the space provided.



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30.3.4 Forest fires

From prehistoric times forests and fire have remained inseparable. In fact the temperate world's forest ecosystem has been re-generated and rejuvenated with active help of forest fires. Forest fires have become a major cause of concern because it threatens human habitats and deprives humans from accessing forest resources. You are already aware of the benefits we derive from forests. Full benefits of forest resources can be obtained only if timber (wood) is protected from fire, diseases and insect pests. Forest cover of India is 19.27% corresponding to 63.3 million hectares.



Fig. 30.4 Forest fire

Forest fire can broadly be classified into three categories;

- Natural or controlled forest fire e.g. by lightning striking dry trees.
- Forest fires caused by heat generated in the litter and other biomass in summer and dry season.
- Human negligence eg., by carelessly dropping lighted matchsticks or cigarette stubs.

Effects of forest fire: Fires are a major cause of forest degradation and have wide ranging adverse ecological, economic and social impacts:

- Loss of valuable timber resources, biodiversity and extinction of plants and animals; loss of natural vegetation and reduction in forest cover are the damages caused to environment by forest fires. Fires may also lead to degradation of catchment areas;
- Other environmental impacts of forest fire are global warming, change in the microclimate of the area with unhealthy living conditions; soil erosion affecting productivity of soils and depletion of ozone layer.

Approximately 300 million people are directly dependent upon collection of non-timber forest products for their livelihood. Forest fires are also responsible for loss of livelihood for tribal people and other rural poor.

Preventive Measures and Management

Damage caused due to a forest fire can be controlled by the following means:

- Get dry litter e.g. dying twigs, leaves etc. removed during summer season.
- Call a fire brigade , try to put out the fire by spraying water or digging around the fire zone.

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- Move farm animals and movable goods to a safe place.
- Do not throw smoldering bidi, cigarette or leave burning wood sticks around.
- Do not enter a forest if it is on fire.

Can you answer why it is difficult to control forest fire? You may discuss with your elders or take the help of internet and answer the question in not more than 50 words in the space provided below. Based on the information collected inform all the members of your family and others about the ways in which a fire can be caused and the methods to prevent fire.

30.3.5 Tsunami

The word *Tsunami* is a Japanese word meaning '*Harbor wave*'. It involves the displacement of very large quantities of water due to earthquakes, landslides or volcanic eruptions. Tsunami occurs due to earthquakes under the ocean. Natural barriers such as shoreline tree cover can mitigate effects of Tsunami.



Fig. 30.5 Tsunami- Earthquake below the sea



Do you know

In the aftermath of the Indian Ocean Tsunami of 26 December 2004, the Ministry of Earth Sciences has set up an Indian Tsunami Early Warning Center at the Indian National Centre for Ocean Information Services (INCOIS) Hyderabad. The Center is mandated to provide advance warnings on Tsunamis likely to affect the coastal areas of the country.

Some Important Case Studies

On December 26, 2004 an earthquake of 8.9 intensity struck Sumatra in Indonesia with the epicenter near its west coast. This triggered a series of devastating Tsunamis along the coasts of Indonesia, Sri Lanka and India. In India Tamil Nadu, Pondicherry, Andhra Pradesh, Kerala, Andaman & Nicobar



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Islands were severely affected. About 10,000 people died and several thousands were rendered homeless.

Man Vs Nature – Earthquake, Tsunami, Nuclear Radiation Threat in Japan

On March 11, 2011 one of the most technologically advanced countries, Japan, was hit by an earthquake of 9.0 magnitude on Richter Scale followed by a 13 ft tsunami in a few minutes. It was the strongest in the world since 130 years. Sendai airport was inundated with cars, trucks, buses and thick mud. A large fire erupted at Cosmo Oil Refinery



Colossal devastation due to tsunami in Japan in 11th March, 2011



The Cars drowning in the sea and habitations washed away by high waves due to Tsunami

State of emergency was declared as five reactors of two nuclear power plants lost cooling ability. Dangerous levels of radiation leak were reported on 15th March 2011 from Fukushima plant after third explosion and fire.



Leakage from the reactor due to effect of Tsunami



The force of the quake moved the island of Honshu by 8ft to the east and the rotation of the Earth was sped up by 1.6 microseconds. The quake happened at the intersection of the North American and Pacific plates in the Northwestern side of the ‘Ring of fire’. The quake caused a rift 15 miles below sea floor that stretched 186 miles long and 93 miles wide.

30.3.6 Landslides

Every monsoon we hear about the massive landslides in the hilly regions leading to blockage of roads. A landslide is the gravitational movement of a mass of rock, earth or debris down a slope. It occurs when a hilly slope becomes unstable. The natural reasons of a landslide are groundwater pressure acting to destabilize the slope, volcanic eruptions, earthquakes, erosion etc. This is one of the natural environmental problems which is influenced by human activities such as deforestation, dynamite blasting of rocks, earth work, constructions, vibrations etc. These activities need cutting down of trees whose roots hold the soil in place.

In majority of the cases, landslides are triggered by heavy or prolonged rainfall. Landslides are a major hazard in most mountains and hilly regions as well as in steep river banks and coastlines. Landslides cause damage to lives, property and disruption in movement of traffic on highways (linking people living in hilly areas). They are a common feature in hilly areas.



Fig. 30.6 Soil erosion and landslides from mountain heights not only block traffic but also damage habitation

30.3.7 Cloudburst

When we hear the news of landslide it is often accompanied by cloudburst. A cloudburst is an extreme amount of precipitation, sometimes with hailstorms and thunderstorms. It occurs for few minutes and can create flood conditions which often results in landslides.

On 6 August 2010, in Leh, a **cloudburst** and heavy rains caused flash floods. About 193 people were reported to have died and 200 people were reported missing. Thousands of people were rendered homeless and extensive damage to property and infrastructure took place.



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Fig. 30.7 A sudden cloudburst catches humans unawares and damages lives and property equally.

Preventive Measures and Management

Prevention of natural disasters like cyclone, tsunami, cloudbursts is not in human hands. However, early warning system could help in saving lives. It is also important to have a ready home plan to tackle aftermath especially by those living in the vicinity of disaster prone areas. The following link and helpline may help you in preparing your plan.

- National Disaster Management can be accessed at <http://www.ndmindia.nic.in>
- Helpline during the disasters (1070).



ACTIVITY 30.2

Retrieve information and graphics about any natural disaster from old newspaper and magazines and write down a report in about 70 words. Also include in your report what role man plays in aggravating the natural calamities and how man can reduce the impact of these natural calamities.



INTEXT QUESTIONS 30.1

1. Define the term ‘natural disaster’? Name any three.

2. You are enjoying a cup of tea with your family sitting on a bed. Suddenly you experience an earthquake. List the first two steps that you and your family should take.

3. State one cause each of (a) forest fire (b) landslide (c) Flood

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4. State any one way by which National Disaster Management Authority of India could help in reducing the loss of life in case of (a) cyclone (b) tsunami.

5. What happens after a cloudburst?

30.4 IMPACT OF HUMAN POPULATION ON THE ENVIRONMENT

We all know that the population of India has crossed the figure of 1 billion. Did you know that the world population of humans today is estimated to be 6.91 billion and is expected to rise between 7.5 and 10.5 billion by the year 2050? This population size would require large scale resources such as water, food, space, energy, land, fuel etc. which will certainly have a drastic effect on the environment at the local as well as global level.

Although the growth in the human population leads to added stress on our resources indiscriminate and irresponsible use of our natural resources makes it even worse. Large population means more land under cultivation for food production and water for irrigation, more fertilizers and pesticides in the environment. Forests are also cleared to create space for housing, roads, educational institutes, industries, etc. To meet the demand of food, housing and energy, environmental resources are being depleted at a fast pace. Environment has the potential to replenish most of its resources over a certain period of time. However, over-exploitation of resources and human activities has resulted in many environmental problems, such as:

- Deforestation and loss of ecosystems
- Air, water and land pollution
- Depletion of fossil fuels (oil, coal and natural gas)
- Concentration of pesticides in organisms leading to biomagnification
- Depletion of ozone layer and global warming
- Unhygienic living conditions due to generation of more waste

Let us study these in detail.

30.4.1 Deforestation

Recall what you have studied in the previous lesson about the importance of forests. Can you now justify how large scale depletion of forests would threaten



the survival of living beings? Taking the hint from the figures given below give any two reasons:

1. _____

2. _____



Fig. 30.8 Stumps of traces after deforestation

Cutting of the natural forest cover is called deforestation. Forests are being cut for various purposes. such as for:

- growing crops and grazing cattle
- meeting the demand of wood and paper

Cutting down of forests may result in the following:

- Destruction of habitat for wild plants and animals leading to loss and disappearance of many species leading to loss of biodiversity. You have studied about this in lesson 19.
- Reduced rainfall
- Lowering of water table affecting water cycle and resulting in drier climate
- Soil erosion, loss of fertility of soil and lack of vegetation leading to desertification
- Increased CO₂ levels in the atmosphere leading to global warming.

Preventive Measures and Management

The cutting and felling of trees should be banned through appropriate legal provisions as you would remember that replenishment of forests in nature takes a long time. This can be done by planting trees in place of cutting down of forests, known as **reforestation**. A reforestation program may include the following:

- Enforcement of strict environmental laws against felling of trees

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- Growing of more plants to substitute for every single tree that has been cut
- Celebrating Van-Mahotsava enthusiastically. This involves mass plantation in the first week of July.
- Practising silviculture, the cultivation of forest trees, as it provides wood for industries and also increases area under the forest cover.
- Social forestry or planting rows of trees, by groups of local people is a means of ‘afforestation’ or building new forests

Reforestation is the reestablishment of the forest cover naturally or artificially soon after the forest is removed.

Afforestation is the establishment of a forest in an area where the preceding vegetation or land use was not a forest.

Silviculture is the practice of controlling the establishment, growth, composition, health, and quality of tree to meet diverse needs and values.

Women in the sub-Himalayan region have started a movement to prevent cutting and felling of trees by hugging them. This is called the “Chipko Movement”.



Fig.30.9 Reforestation – one step to put deforestation on back-gear



INTEXT QUESTIONS 30.2

Fill in the blanks.

1. The number of animals, such as _____ and _____ is falling due to cutting of forests.
2. Need for _____ leads to felling of trees.
3. Practice of _____ and _____ can help in reforestation.
4. Environmental problems, such as _____ and _____ are a result of increase in human population.

30.4.2 POLLUTION

Any undesirable change in the environment due to human activity is **pollution**.



Notes

Human life involves a number of daily activities. Bathing and washing of clothes with soaps and detergents add some chemical residue to water and change its quality. Cooking of food by using firewood may give out smoke in the air. Agricultural activities may dump fertilizers and pesticides in the environment. Isn't it surprising that the fertilizers that are added to improve the crop production end up polluting the environment when used indiscriminately?

Each activity, human or industrial, discharges some unwanted substances in the environment. The presence of unwanted substances in a concentration which can have an adverse effect on organisms and environment is called **pollution**. Although the development and technological growth has given new devices for human comfort it has also added substances that may have adverse effects on life and environment.

Thus, **an undesirable change** in the physical, chemical and biological characteristics of the environment especially air, water and land that may **adversely affect human population** and the **wild life** and **cultural assets** (buildings and monuments etc.) is called **pollution**.



Fig. 30.10 Air and water pollution



ACTIVITY 30.3

Look at the picture given below. Is this the state of environment we live in? What major sources of pollution can you identify in the pictures given below? Write a sentence on each of them in the space provided.

1. _____
2. _____
3. _____
4. _____

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Depending upon the area or the part of environment affected, pollution may be of the following types:

- Air pollution
- Water pollution
- Land pollution
- Noise pollution

A. Air Pollution

We all feel and breathe air. Sometimes, we feel very happy and remark about the fresh air around us. The pollution in air may not be noticed until we see dust or smoke coming out from some source or some foul smell present all around. All human activities from cooking at home to the working of highly mechanized industries contribute to air pollution. You have already learnt about sources and prevention of air pollution in lesson-26 “Air and Water”. Recall the information and fill in the given blanks for a quick review.

- Addition of unwanted substances in the environment is called _____.
- Automobile exhaust gives out pollutants, such as _____ and _____.
- Increased carbon dioxide level in earth's atmosphere leads to the phenomenon of _____.
- _____ and _____ are examples of Suspended Particulate Matter.
- Air pollution can be prevented by installing _____ and _____ in industries.



Notes

B. Water Pollution

The contamination of the water bodies by discharge of pollutants directly or indirectly into them is called **water pollution**. Water pollution could be due to natural or human activities. You have already learnt about sources and prevention of water pollution in lesson-26 “Air and Water”. Recall the information.

Table: 30.1 Some major water pollutants, their sources and effects

| Type of pollutant | Examples | Sources | Effects |
|----------------------------------|--|--|--------------------------|
| Infectious agents | Bacteria, viruses, and other parasites | Human and animal excreta | Water-borne diseases |
| Organic chemicals | Pesticides, detergents, oil | Agricultural, industrial and domestic waste | Biomagnifications |
| Inorganic chemicals, fertilizers | Acid, alkalis, metals, salts | Industrial waste, household cleaning agents, surface runoff | Water unfit for drinking |
| Radioactive materials | Uranium, thorium, iodine | Mining and processing of ores, power plants, natural sources | Genetic disorders |

Table: 30.2 Some major disturbances in the ecosystem due to water pollution

| Pollutant | Sources | Cause | Effect |
|--------------------------------------|---|-------------------|--|
| Nitrates, phosphates, ammonium salts | Agricultural fertilizers, sewage, manure | Plant nutrients | Eutrophication |
| Animal waste and plant residues | Sewage, paper mills, food processing wastes | Oxygen deficiency | Death of aquatic animals |
| Heat | Power plants and industrial cooling | Thermal discharge | Death of fish |
| Oil slick | Leakage from oil ships | Petroleum | Death of marine life due to non-availability of dissolved oxygen |

Fertilizers and pesticides are widely used in agriculture. Their excessive use to increase agricultural yield has led to the phenomenon of **eutrophication and biomagnifications**, which are serious consequences of water pollution.

- **Eutrophication:** With the use of high-yielding varieties of crops application of fertilizers and pesticides has increased. Excess fertilizers may mix with surface water bodies (surface runoff). The enrichment of water with nutrients such as nitrates and phosphates that triggers the growth of green algae is called **eutrophication**. This fast growth of algae followed by their decomposition depletes the water body of the dissolved oxygen. As a result, aquatic animals die of oxygen shortage.

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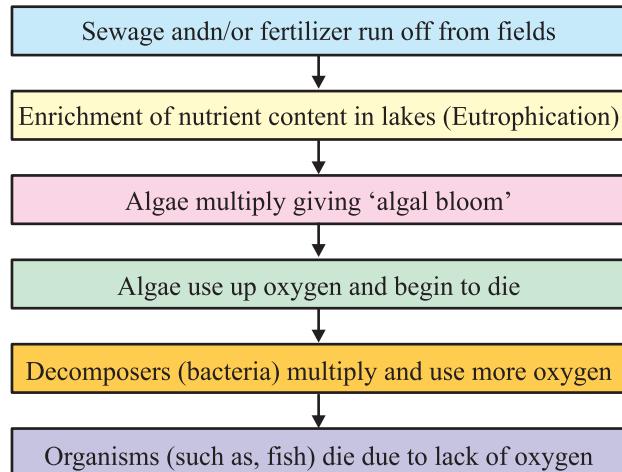


Fig. 30.11 Sequence of events that may occur as a result of eutrophication

- **Biomagnification:** Entry of harmful, non-biodegradable chemicals in small concentration and their accumulation in greater concentration in the various levels of a food chain is called biomagnification. Non-biodegradable pesticides, such as DDT are widely used for crop protection. Once they enter the food chain, their concentration keeps on increasing with each trophic level (steps of a food chain). As a result, accumulation of these compounds takes place in the body of top consumers over a period of time. Consider the following food chain. Is there any difference in the concentration of DDT in water and that of the body of the Pelican bird?

Water → Algae → Fish → Pelican bird (top consumer)
0.2 ppm → 77 ppm → 500-600 ppm → 1700 ppm
(ppm = parts per million)

DDT used in small quantities to kill mosquitoes can enter the food chain and may get concentrated due to its non-biodegradable nature in the body of birds (top consumer). This causes adverse effects, such as weak egg shells, resulting in decreased population.



Do you know

Death of vultures in large numbers has been reported due to eutrophication near Bharatpur area (Rajasthan).

High concentration of DDT has been reported in milk from cattle and mother's milk leading to various disorders in the newborn baby.

"We cannot allow people to die from malaria, but we also cannot continue using DDT if we know about the health risks."

Tiaan de Jager



Notes

Control of water pollution

- Minimise the water by altering the technique involved.
- Maximum recycling of water after treatment (purification of waste water for reuse), and
- Limiting the quantity of waste water discharge.

C. Soil pollution and land pollution

Addition of substances that change the quality of soil by making it less fertile and unable to support life is called **soil pollution**. Following are the sources of soil pollution:

- **Domestic sources:** plastic bags, kitchen waste, glass bottles and other solid waste.
- **Industrial sources:** chemical residue, fly ash, metallic waste
- **Agricultural residues:** fertilizers and pesticides

Soil erosion also leads to the degradation of soil due to uprooting of plants and over-grazing.

D. Noise pollution

You may enjoy listening to music. But if the volume is too high you may not enjoy it any longer. It may become irritating. Noise can be simply defined as “unwanted sound”. It is generally higher in urban and industrial areas than in rural areas. Workers using heavy machinery are exposed to high noise levels for long period of work hours everyday. Intensity of sound is measured in a unit called **decibel** or **dB**. *The lowest intensity of sound that human ear can hear is 10 dB.*

Sources of noise pollution

The major sources of noise pollution are:

- Industrial activities;
- Vehicle such as aircraft, trains, automobiles, etc.;
- Use of loud speakers and loud music systems at public places;
- Noisy fireworks;
- Increased volume of television.

Effects of noise pollution

- Noise pollution can cause serious damage to ears leading to temporary loss of hearing, earache, sometimes even permanent deafness

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- Noise prevents concentration, increases irritability and causes headache. It may lead to increased blood pressure and irregular heart beat
- Ringing of ears (a feeling of sound coming from within the ear in a very quiet environment) is also a result of noise pollution
- Noise disturbs sleep and causes slow recovery from sickness

Preventive Measures and Management

Following steps can be taken to control or minimize noise pollution:

- Keep the volume of your radio and television low
- Use automobile horn only in case of emergency
- Avoid noisy fire crackers
- Tune and service all machines including automobiles at regular intervals. Use of silencers should be mandatory.
- Plant trees, as a green belt around your home is an efficient noise absorber.
- Report playing of loudspeakers during odd hours to the police immediately.



ACTIVITY 30.4

Conduct a survey among people living in very noisy areas, such as near railway crossings, place with heavy vehicular traffic, or a construction site (Your survey must be from two different sites and should include at least two persons from each site). Find out if the people living in such places show signs of adverse effect of noise pollution such as of stress, headache, and inability to concentrate, reduced or loss of hearing etc.? Record your observations in the table given below.

| Name | Site of residence | Stress | Headache | Lack of concentration | Reduced /Loss of hearing | Any other |
|------|-------------------|--------|----------|-----------------------|--------------------------|-----------|
| | | | | | | |
| | | | | | | |
| | | | | | | |

Keeping in mind that it is not easy to change the place of residence suggest two ways by which you can reduce noise pollution:

1. _____
2. _____



INTEXT QUESTIONS 30.3

Fill in the blanks.

1. _____ and _____ are examples of natural resources of water pollution.
2. Thermal discharge into rivers may lead to the death of _____.
3. Presence of _____ and _____ in water may lead to infectious diseases.
4. Enrichment of water bodies with nutrients coming from fields is called _____.
5. Non-biodegradable wastes, such as _____ may lead to biomagnification upon entering the food chain.
6. Domestic sources, such as _____ and _____ lead to land pollution.
7. Unwanted sound may lead to _____ pollution.
8. Noise pollution may be caused by _____ and _____

Notes**30.5 WASTE AND ITS MANAGEMENT**

Anything which is unwanted or useless is termed as waste. The waste generated from various sources can be categorized into two types: Biodegradable waste and Non-biodegradable waste.

- 1. Biodegradable waste** includes substances that can be degraded by microbes into harmless and non-toxic substances. Agricultural and animal wastes like leaves, twigs, hay, dung, etc. are biodegradable wastes.
- 2. Non-biodegradable waste** cannot be easily degraded. Aluminum cans, plastics, glass, electronic waste, batteries etc. are examples of non-biodegradable wastes.

Waste can also be classified as *municipal waste*, *hazardous waste*, *biomedical waste* etc. **Radioactive waste comes under the category of hazardous waste.** Do you know that radioactive wastes produced during nuclear reactions and take a long time to decay and are harmful to all living organisms including human beings?

With the increasing population size, waste generated is becoming unmanageable. Open dumps and heaps of garbage is a common site. This unhygienic atmosphere leads to problems related to human health and environment because untreated, uncovered waste is a breeding ground for flies, rats, mosquitoes and other insects

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which spread various diseases. The rainwater runoff from such sites contaminates nearby land and water.

In fact, cities and some villages use landfills to manage the solid waste. Also, incineration plants are used in big cities to deal with waste especially biomedical waste. **Incineration** is the process of burning of waste after segregating the recyclable material. The end product of this process is called ash which is then disposed off in landfills. Unfortunately incineration produces toxic gases which cause air pollution. In fact, the best practice of waste management is to minimize the generation of waste. Let the 4 R's of conservation – **Reduce, Reuse, Repair and Recycle** be our guiding principles for reducing waste generation.

If a waste material is processed by some means and converted to a product, we call the process **recycling**. It helps in efficient management of wastes and also reduces the load on natural resources. Recycling of plastics and paper, converting municipal waste into manure, and rice husk into wood particle board are some such examples. Use of cattle dung for the production of biogas is also good example of recycling of waste for the production of energy. Do you know that human excreta is also being used to generate biogas? Suggest a few more examples from your neighbourhood.

30.6 GLOBAL ENVIRONMENTAL PROBLEMS

On the global scale, we will discuss few environmental problems such as ozone hole, global warming, photochemical smog and acid rain etc. The cause of all these and many more problems may be localized but their effect is felt world over.

30.6.1 The ozone hole: Depletion of the ozone layer

The ozone layer present in the earth's atmosphere prevents the entry of sun's harmful ultraviolet (UV) radiations reaching the Earth's surface. Industrial use of chemicals called chlorofluorocarbons (CFCs) in refrigeration, air conditioning, cleaning solvents, fire extinguishers and aerosols (spray cans of perfumes, insecticides, medicines etc.) damage the ozone layer.

Chlorine present in the CFCs on reacting with ozone (O_3) layer splits the ozone molecule to form oxygen (O_2). Amount of ozone, thus, gets reduced and cannot prevent the entry of UV radiations. There has been a reduction by 30-40% in the thickness of the ozone umbrella or shield over the Arctic and Antarctic regions. This thinning of ozone layer is called **ozone hole**.



Notes

The depletion of ozone layer may lead to the following hazards:

- Sunburn, fast ageing of skin, cancer of skin, cataract (opaqueness of eye lens leading to loss of vision), cancer of the retina (sensitive layer of the eye on which the image is formed).
- Genetic disorders
- Reduced productivity at sea and forests

The damage to the ozone layer can be prevented by:

- Reducing the consumption of CFCs by adopting alternative technologies (substituting air conditioning gases by non-CFCs)
- Discouraging the use of aerosol containing spray cans

30.6.2 Global Warming – The greenhouse effect

Greenhouse is referred to as a chamber where plants are grown in a closed warm environment as compared to the outside temperature. This is normally practiced in cold region of the hills. The solar radiations bringing heat (in the form of infra-red rays from the sun) are trapped inside the chamber. The atmosphere on earth can also act in a similar way as shown below.



Fig. 30.12 (a) Greenhouse

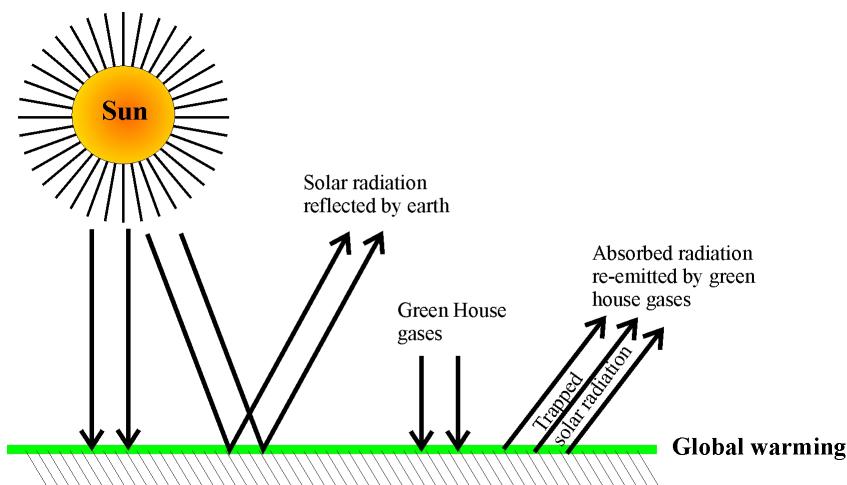


Fig. 30.12(b) The green house effect

Industrialization and urbanization has lead to deforestation and release of gases, such as CO_2 , CH_4 and N_2O into the atmosphere. Do you know that plant eating



animals release a large amount of methane into the atmosphere? These gases have converted the earth's atmosphere into a **Greenhouse**. Heat contained in the solar radiations is allowed to come in, but the heat contained in it is not sent back due to increasing concentration of CO₂ and other greenhouse gases. As a result, the earth's average temperature is increasing each year leading to **global warming**.

Effects of global warming

Although the increase in global temperature in the last hundred years has been estimated to rise by only 1 degree, it has resulted in serious consequences, such as:

- Melting of snow caps/ glaciers and rising of sea level.
- Submerging of coastal areas of the Maldives islands in the Indian Ocean.
- Unpredictable weather patterns.
- Early maturation of crops leading to reduced grain size and low yields.
- Interference with the hatching of eggs in certain fish.

30.6.3 Photochemical Smog

Pollutants like sulphur dioxide which is released while burning sulphur containing fuel and particulate matter like soot present in stagnant air masses, get modified in sunlight and form a sheet called photochemical smog.

Smog is a combination of fog, smoke and fumes released by mills and factories, homes and automobiles.

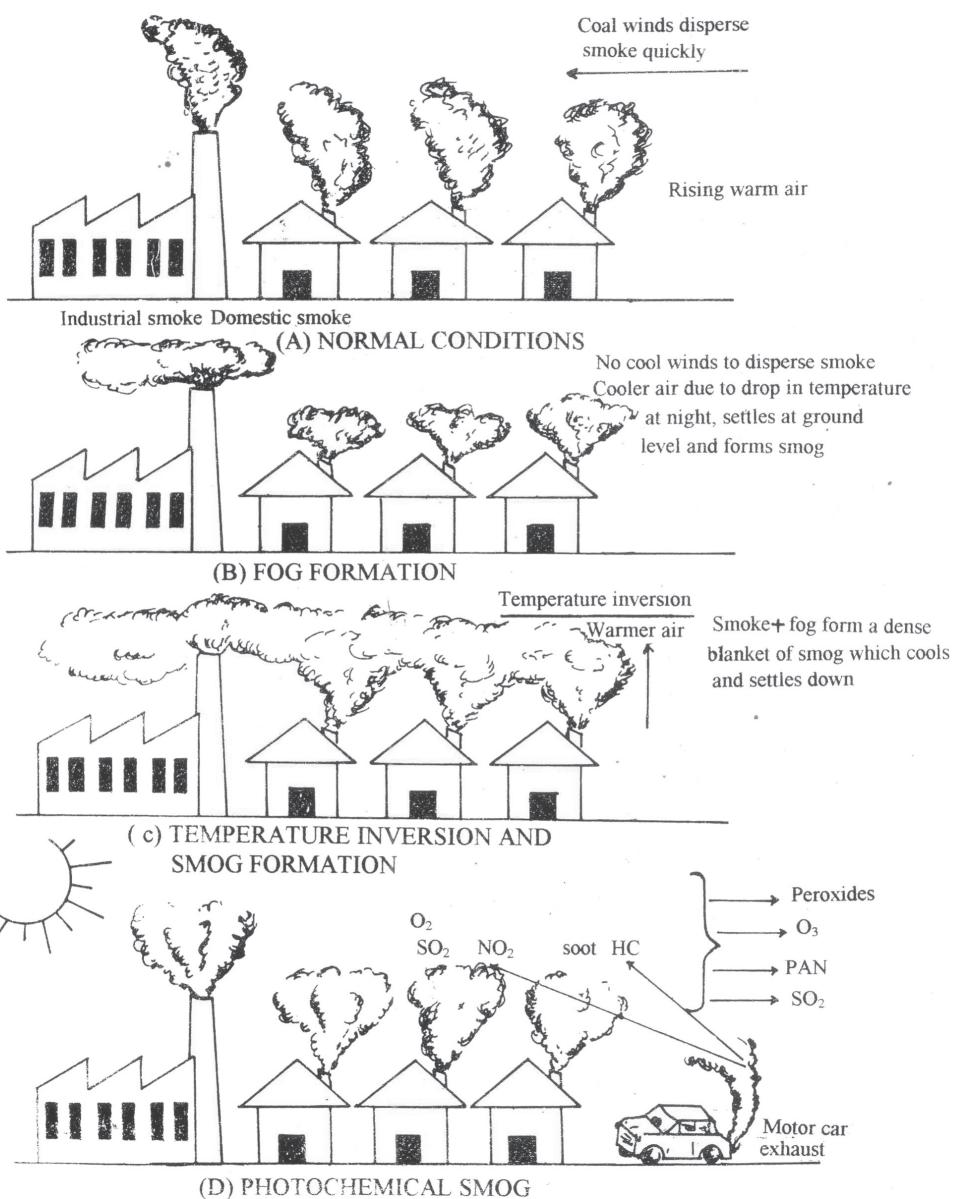
When sunlight falls on stagnant air under low humid conditions in the presence of pollutants such as SO₂, soot, nitrogen oxide and hydrocarbons, photochemical smog is formed. (Photochemical: chemical reactions in the presence of light). Smog stays close to the ground and reduces visibility.

Photochemical smog is also called Pan smog due to the production of peroxyacetyl nitrate (PAN) and ozone which form from hydrocarbons and nitrogen oxides in the air in presence of solar radiation. PAN and Ozone are called **photochemical oxidants**. Both of these are toxic irritants to human lungs.

Smog formation is accompanied by temperature inversion or **Thermal inversion**. Temperature inversion causes smog to settle and remain near the ground till wind sweeps it away. Normally, warm air rises up into atmosphere. When a layer of cool air at the ground level is trapped there by an overlying layer of warm stagnant air, it is called temperature or thermal inversion (Fig. 30.13).



Notes

**Fig. 30.13 Photochemical Smog**

Exposure to smog causes respiratory problems, bronchitis, sore throat, cold, headache and irritation to eye (red shot eyes). Smog also destroys crops and reduces crop yield.

30.6.4 Acid Rain

Acid rain is caused when nitrogen oxides, SO₂ and particulate matter in the atmosphere react with H₂O to produce acids. (Fig. 30.14)

Acid rain is harmful to the environment. It affects life in water and on land. The fish cannot survive in acidic water below pH 4.5. It can also damage trees in the

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forests. In humans it can cause asthma and premature deaths when food, water or air which is in contact with acid deposits is consumed. The soil characteristics are also greatly affected; this has an effect on the crops and agricultural productivity.

The buildings, monuments are also damaged by acid rain. It also increases the corrosion rate of metals.

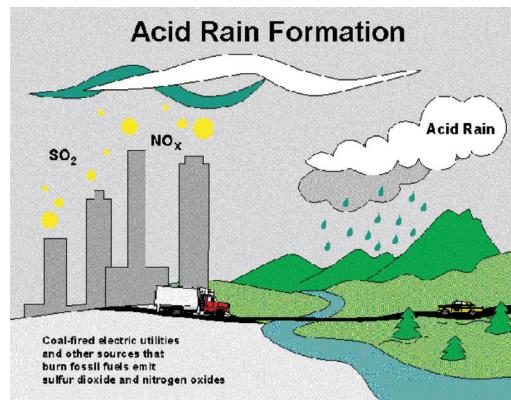


Fig. 30.15(a) Monument prone to damage by acid rain (b) Fish dying due to acidic water of polluted rivers



WHAT YOU HAVE LEARNT

- Our environment is being affected both by human activities as well as natural phenomena.
- Growing human population is depleting natural resources at a very fast rate and the environment is being degraded very fast.
- Earthquakes, floods, and volcanic eruptions, tsunami, landslides are examples of some natural environmental problems.
- Forest fires may be caused due to human negligence; lightning and extreme rise in temperature in rocky areas, and can be controlled by removing inflammable material from fire line.
- Increased population and mindless over-exploitation of resources and many environmental problems, such as pollution, soil degradation, destruction of wild life, etc.
- Trees provide wood for multiple uses, shelter to wild life, soil conservation and rainfall. Cutting down of trees may lead to environmental problems.



- The practice of reforestation includes planting of more trees to develop forest cover.
- Addition of unwanted substances in the environment is called pollution. Pollution could affect air, water, soil and noise quality.
- Soil pollution includes addition of substances that reduce the fertility of the soil.
- Waste can be classified into biodegradable (e.g. cattle dung, vegetable peels, paper, wood etc.) and non-biodegradable (e.g. aluminium cans, glass bottles, plastics, DDT etc.).
- Recycling of wastes, such as cattle dung, paper, sewage and rice husk, into useful products help in conservation of resources.
- Ozone provides a protective layer against harmful ultra-violet rays coming from the sun. Excessive use of chemicals, such as CFCs used in spray cans, gas used in refrigerators and air conditioners, lead to thinning of the ozone layer.
- Accumulation of high concentration of carbon dioxide has led to the phenomenon of global warming (greenhouse effect), and has resulted in increased earth's temperature.



TERMINAL EXERCISES

1. Choose the correct option

- (i) Growing trees for afforestation is called
 - a) Monoculture
 - b) horticulture
 - c) Silviculture
 - d) agriculture
- (ii) Which of the following chemicals lead to depletion of the ozone layer?
 - a) Carbon dioxide
 - b) Chloro-fluorocarbons
 - c) Nitrogen
 - d) Water vapour
- (iii) Which of the following can be found in the body of top consumers in high concentration?
 - a) Nitrates
 - b) Phosphates
 - c) DDT
 - d) Vitamins
- (iv) Soil erosion can be prevented by
 - a) Use of pesticides
 - b) deforestation
 - c) Afforestation
 - d) excessive use of fertilizers

2. Which of the following are biodegradable?

Aluminum foil, paper, ballpoint pen refill, grass

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3. Which gaseous pollutant has the ability to absorb infra-red radiations?
4. A chemical factory in a village discharges its waste that is rich in nitrogen, in a pond. Which phenomenon do you expect to take place?
5. Leakage of gases used in refrigerators and air conditioners for cooling are not considered eco-friendly. Why?
6. A ship carrying oil from the gulf region collides with huge rocks and gets damaged. Is this just news or has some serious consequences? Give your opinion in one sentence.
7. Give the term given to replenishment of the forests from where wood can occasionally be taken for commercial use?
8. List two ways of replenishing forests.
9. To set up a new industry, a large forest area had to be cut. List four ways in which the environment in that area may be affected.
10. How does production of more paper in the world contribute to ecological imbalance? Use only four key phrases to support your answer.
11. What could be a major disadvantage for man being placed at the top of the food chain? Name the phenomenon that may cause this harmful effect.
12. List any three ways in which noise from various sources can affect the well-being of a person. Suggest few methods to control noise pollution.
13. What does 'Global warming' mean? Name the gas responsible for this phenomenon and why should it be considered an environmental problem.
14. It was observed that a large number of vultures were dying around a crop field. Considering the fact that vultures are top consumers, explain the phenomenon that may have caused their death in large numbers.
15. List and classify the waste generated at home? What is the difference between the different 'groups'? How would you manage this waste so that it causes least pollution?
16. Name the instrument used to measure the magnitude of an earthquake. Suggest any one of preventing way with them in earthquake prone areas.



ANSWERS TO INTEXT QUESTIONS

30.1

1. An environmental problem caused by natural factors and not by humans.

2. Tsunami/earthquake/floods/forest fire/ etc.

Tsunami: earthquake under ocean

Forest fire: lightning striking dry twigs or human negligence

Land slide : Soil erosion/cutting trees etc.

Creep under the bed or table; cover your head with your arms/pillow/any other protective material around.

3. (a) Cause of Forest fires :

- Lightning striking dry grass/trees
- Heat generate in the litter in dry season
- Human negligence

(b) Land slide : Heavy / prolonged rainfall / deforestation / dynamite blasting

(c) Flood — inadequate capacity within the banks of the river to contain the flow of water during heavy rainfall

4. By issuing early warning of such natural disaster / plan to tackle such disasters.

5. Extreme amount of precipitation alongwith thunderstorm/hailstorm; flash flood cause loss of lives and property.

**Notes**

30.2

1. Cheetah, Tiger
2. Housing, construction of roads, industrialization (any one)
3. Silviculture, mass plantation
4. Air pollution, water pollution, global warming (any two)

30.3

1. Excreta (Animal/Human) and agricultural water.
2. Fish
3. Human and animal excreta.
4. Eutrophication
5. DDT
6. Plastic bags/kitchen waste/glass bottles etc. (any two)
7. Noise pollution
8. Vehicles/loudspeakers/loud volume of TV, music system/fireworks.