
16. Environmental Issues

Question 1. What are the various constituents of domestic sewage? Discuss the effects of sewage discharge on a river.

Answer: Domestic sewage is the waste water (sewage) discharged from residential areas. It consists of various constituents such as

Dissolved materials in the form of both organic and inorganic compounds like toxic metal ions, nitrates, ammonia etc.

Colloidal particles also in both organic and inorganic forms like faecal matter, paper, cloth fibers, bacteria etc.

Suspended impurities mainly consist of sand and clay.

Being rich in biodegradable or organic matter, domestic sewage stimulates microbial growth for the decomposition process to occur. This increases Biochemical oxygen demand of water and stimulating mineral pollution or eutrophication. It imparts bad color and odor to the water body and also paves way for waterborne diseases.

Question 2. List all the wastes that you generate, at home, school or during your trips to other places. Could you very easily reduce the generation of these wastes? Which would be difficult or rather impossible to reduce?

Answer: **Wastes generated at home** include plastic bags, paper napkin, toiletries, kitchen wastes (such as peelings of vegetables and fruits, tea leaves), domestic sewage, glass, etc.

Wastes generated at schools include waste paper, plastics, vegetable and fruit peels, food wrappings, sewage etc.

Wastes generated at trips or picnics include plastic, paper, vegetable and fruit peels, disposable cups, plates, spoons etc.

Yes, wastes can be easily reduced by the judicious use of the above materials. Wastage of paper can be minimized by writing on both sides of the paper and by using recycled paper. Plastic and glass waste can also be reduced by recycling and re-using. Also, substituting plastics bags with biodegradable jute bags can reduce wastes generated at home, school, or during trips. Domestic sewage can be reduced by optimizing the use of water while bathing, cooking, and other household activities.

Non- biodegradable wastes such as plastic, metal, broken glass, etc are difficult to decompose because micro-organisms do not have the ability to decompose them.

Question 3. Discuss the causes and effects of global warming. What measures need to be taken to control global warming?

Answer: Global warming- The rise in the mean temperature of the earth is called global warming.

Causes of global warming- Global warming is mainly caused due to the increased amounts of greenhouse gases in the atmosphere. These gases allow long wave radiations to enter into the atmosphere but do not let them leave, so these radiations remain trapped in the atmosphere and cause the mean temperature to rise. This is similar to the effect of glass walls in a greenhouse on the plants.

The main greenhouse gases are:

1. Carbon dioxide- 60% of global warming is caused by carbon dioxide. The atmospheric concentration of carbon dioxide has risen to 280 ppm in 1750 to 380 ppm in 2007 and until 2019 it has risen to above 400. The main reason for the increase in the combustion of fossil fuels and deforestation.
2. Methane- It contributes to 20 % of global warming. The main reason for increase includes incomplete combustions, anaerobic decomposition, chimneys, paddy fields etc.
3. Chlorofluorocarbons- These are compounds of carbon and halogens used as propellants in aerosols, refrigerants, fire extinguishers, plastic foams, jet fuels etc.
4. Nitrous oxide- they are responsible for causing 6 % of global warming. It is formed during the combustion of nitrogen-rich fuels.

Effects of global warming

1. Melting of snow- Due to the increase in global temperature, the polar ice caps and snow mountains will start melting.
2. Sea level- Due to the melting of snow, the sea level will rise leading to submerging of coastal areas.
3. Odd climatic changes- Global warming will lead to odd climatic changes such as a reduction in precipitation, rise in El Nino effect, more floods and droughts, change in the global air current etc.
4. Vegetation- Forest will be turned into scrub vegetation, tropic will have more deserts.
5. Food production- Global warming may lead to a reduction in food production.

Measures to control global warming

1. Reduction in CFCs production
2. Increase in forest areas
3. reduction in the exploitation of fossil fuels
4. Checking population growth

Question 4. Match the items given in column A and B:

Column A	Column B
(a) Catalytic converter	(i) Particulate matter
(b) Electrostatic precipitator	(ii) Carbon monoxide and nitrogen oxides
(c) Earmuffs	(iii) High noise level
(d) Landfills	(iv) Solid wastes

Answer:

Column A	Column B
(a) Catalytic converter	(ii) Carbon monoxide and nitrogen oxides
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(d) Landfills	(iv) Solid wastes

Question 5. Write critical notes on the following:

(a) Eutrophication

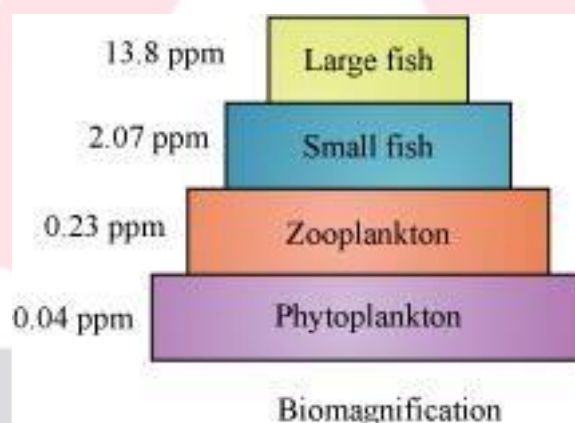
(b) Biological magnification

(c) Groundwater depletion and ways for its replenishment

Answer: (a) Eutrophication:- It is the natural ageing process of a lake caused due to nutrient enrichment. It is brought down by the runoff of nutrients such as animal wastes, fertilizers, and sewage

from land which leads to an increased fertility of the lake. As a result, it causes a tremendous increase in the primary productivity of the ecosystem. This leads to an increased growth of algae, resulting into algal blooms. Later, the decomposition of these algae depletes the supply of oxygen, leading to the death of other aquatic animal life.

(b) Biological magnification: - To protect the crops from the several diseases and pests, a large number of pesticides are used. These pesticides reach the soil and are absorbed by plants with water and minerals from the soil. Due to rain, these chemicals can also enter water sources and into the body of aquatic plants and animals. As a result, chemicals enter the food chain. Since these chemicals cannot be decomposed, they keep on accumulating at each trophic level. The maximum concentration is accumulated at the top carnivore's level. This increase in the concentration of pollutants or harmful chemicals with an increase in the trophic level is called biological magnification. For example, high DDT concentrations were found in a pond. The producers (phytoplankton) were found to have 0.04 ppm concentration of DDT. Since many types of phytoplankton were eaten by zooplankton (consumers), the concentration of DDT in the bodies of zooplankton was found to be 0.23 ppm. Small fish that feed on zooplankton accumulate more DDT in their body. Thus, large fish (top carnivore) that feed on several small fish have the highest concentration of DDT.



(c) Ground water depletion and ways for its replenishment: - The level of ground water has decreased in the recent years. The source of water supply is rapidly diminishing each year because of an increase in the population and water pollution. To meet the demand of water, water is withdrawn from water bodies such as ponds, rivers etc. As a result, the source of ground water is depleting. This is because the amount of groundwater being drawn for human use is more than the amount replaced by rainfall. Lack of vegetation cover also results in very small amounts of water seeping through the ground. An increase in water pollution is another factor that has reduced the availability of ground water.

Measures for replenishing ground water:-

- (i) Preventing over-exploitation of groundwater
- (ii) Optimizing water use and reducing water demand
- (iii) Rain water harvesting

(iv) Preventing deforestation and plantation of more trees

Question 6. Why does ozone hole form over Antarctica? How will enhanced ultraviolet radiation affect us?

Answer: (i) During winter months (June to August), Antarctic region receives no sunlight and is characterized by very low temperature (about - 85°C). Further Antarctic air is isolated from that of rest of world by polar vortex. These environmental conditions favour the formation of ice clouds which provide catalytic surface for the action of chlorine atoms, produced by the chlorofluorocarbons, on the ozone. But the ozone degradation occurs only in the presence of sunlight which is available only in spring (September to October). So the ozone hole appears in spring but disappears in summers.

(ii) Ill-effects. The thinning of ozone shield results in an increase in the UV -B radiations reaching the earth's surface. The increased UV-radiations increase the incidence of cataract and skin cancer. These also diminish the functioning of immune system of human beings, and inhibit the rate of photosynthesis in most of the phytoplanktons.

Question 7. Discuss the role of women and communities in protection and conservation of forests.

Answer: (i) **Bishnois** – are group of followers of Guru Janbeshwar Maharaj, a small community inhabiting a village near Jodhpur in Rajasthan. They are known for peaceful co-existence with nature. In 1731, once when king of Jodhpur, asked his fellow people to arrange wood for new palace, they reached Bishnois village. Effort of cutting trees was thwarted by Bishnois. A Bishnois women Amrita Devi hugged the trees and daring King's men to cut her before cutting the trees. But, kings men cut the tree down along with her. Her 3 daughters and 100 other Bishnois followed her and all lost their lives saving trees. Now there is Amrita Devi Bishnoi Wildlife Protection Award given to individuals or communities from rural area who show courage and dedication to protect wildlife and trees.

(ii) **Chipko movement** – of Garhwal Himalayas. In 1974, local women showed extreme courage by hugging trees and protecting them from the axe of contractors.

(iii) **Appiko movement** – Conservation, plantation and Rational use is their belief.

(iv) **Joint Forest Management (JFM)** – Government of India in 1980s introduced concept of JFM so as to work closely with local communities for protecting and managing forests. In return their service, they were rewarded with various benefits and forest were conserved in sustainable manner. Communities got benefit of various forest products like fruits, gum, rubber, medicine etc.

Question 8. What measures, as an individual, would you take to reduce environmental pollution?

Answer: As an individual, we can take certain steps to reduce environmental pollution such as:

- (i) Using CNG instead of petrol, diesel. Opting more for either public transport or encouraging more and more carpooling.
- (ii) Minimising the solid waste generation and recycling the plastic, metal and glass commodities.
- (iii) Using the biodegradable waste generated in the kitchen to prepare compost.
- (iv) Avoiding the usage of plastic bags wherever possible and opting for the jute or cotton bags.
- (v) Avoiding tinned food products.
- (vi) Celebrating a cracker-free Diwali and encouraging others to follow it as well.
- (vii) Using catalytic converters in the automobiles. Getting them checked for pollution on a regular basis.
- (viii) Educating everyone and encouraging them to opt for renewable sources of energy.

Question 9. Discuss briefly the following:

(a) Radioactive wastes

(b) Defunct ships and e-wastes

(c) Municipal solid wastes

Answer: **(a) Radioactive wastes:-** Radioactive wastes are generated during the process of generating nuclear energy from radioactive materials. Nuclear waste is rich in radioactive materials that generate large quantities of ionizing radiations such as gamma rays. These rays cause mutation in organisms, which often results in skin cancer. At high dosage, these rays can be lethal.

Safe disposal of radioactive wastes is a big challenge. It is recommended that nuclear wastes should be stored after pre-treatment in suitable shielded containers, which should then be buried in rocks.

(b) Defunct ships and e-wastes:- Defunct ships are dead ships that are no longer in use. Such ships are broken down for scrap metal in countries such as India and Pakistan. These ships are a source of various toxicants such as asbestos, lead, mercury etc. Thus, they contribute to solid wastes that are hazardous to health.

E-wastes or electronic wastes generally include electronic goods such as computers etc. Such wastes are rich in metals such as copper, iron, silicon, gold etc. These metals are highly toxic and pose serious health hazards. People of developing countries are involved in the recycling process of these metals and therefore, get exposed to toxic substances present in these wastes.

(c) Municipal solid wastes:- Municipal solid wastes are generated from schools, offices, homes, and stores. It is generally rich in glass, metal, paper waste, food, rubber, leather, and textiles. The open dumps of municipal wastes serve as a breeding ground for flies, mosquitoes, and other disease-causing microbes. Hence, it is necessary to dispose municipal solid waste properly to prevent the spreading of diseases. Sanitary landfills and incineration are the methods for the safe disposal of solid wastes.

Question 10. What initiatives were taken for reducing vehicular air pollution in Delhi? Has air quality improved in Delhi?

Answer: Delhi has been categorized as the fourth most polluted city of the world in a list of 41 cities. Burning of fossil fuels has added to the pollution of air in Delhi.

Various steps have been taken to improve the quality of air in Delhi.

(a) Introduction of CNG (Compressed Natural Gas):By the order of the supreme court of India, CNG-powered vehicles were introduced at the end of year 2006 to reduce the levels of pollution in Delhi. CNG is a clean fuel that produces very little unburnt particles.

(b) Phasing out of old vehicles

(c) Use of unleaded petrol

(d) Use of low-sulphur petrol and diesel

(e) Use of catalytic converters

(f) Application of stringent pollution-level norms for vehicles

(g) Implementation of Bharat stage I, which is equivalent to euro II norms in vehicles of major Indian cities.

The introduction of CNG-powered vehicles has improved Delhi's air quality, which has led to a substantial fall in the level of CO₂ and SO₂. However, the problem of suspended particulate matter (SPM) and respiratory suspended particulate matter (RSPM) still persists.

Question 11. Discuss briefly the following:

(a) Greenhouse gases

(b) Catalytic converter

(c) Ultraviolet B

Answer:

(a) Greenhouse gases:- The greenhouse effect refers to an overall increase in the average temperature of the Earth due to the presence of greenhouse gases. Greenhouse gases mainly consist of carbon dioxide, methane, and water vapour. When solar radiations reach the Earth, some of these radiations are absorbed. These absorbed radiations are released back into the atmosphere. These radiations are trapped by the greenhouse gases present in the atmosphere.. This helps in keeping our planet warm and thus, helps in human survival. However, an increase in the amount of greenhouse gases can lead to an excessive increase in the Earth's temperature, thereby causing global warming.

(b) Catalytic converter:- Catalytic converters are devices fitted in automobiles to reduce vehicular pollution. These devices contain expensive metals such as platinum, palladium, and rhodium that act as catalysts. As the vehicular discharge passes through the catalytic converter, the unburnt hydrocarbons present in it get converted into carbon dioxide and water. Carbon monoxide and nitric oxide released by catalytic converters are converted into carbon dioxide and nitrogen gas (respectively).

(c) Ultraviolet-B:- Ultraviolet-B is an electromagnetic radiation which has a shorter wavelength than visible light. It is a harmful radiation that comes from sunlight and penetrates through the ozone hole onto the Earth's surface. It induces many health hazards in humans. UV -B damages DNA and activates the process of skin ageing. It also causes skin darkening and skin cancer. High levels of UV -B cause corneal cataract in human beings.