

ENVIRONMENTAL ISSUES

The rapid expansion of the human population has resulted in a surge in the need for different resources. To meet these demands, we have been excessively exploiting natural resources. Consequently, this exploitation has given rise to numerous environmental challenges, such as pollution, which poses significant difficulties for both humans and other organisms to survive on our planet. In response to these concerns, the Government of India took a proactive step by enacting the Environment Protection Act in 1986. The primary objective of this legislation is to safeguard and enhance the overall quality of the environment.

Pollution

Pollution refers to any undesirable alteration in the natural environment that poses harm to living beings. These alterations are caused by agents known as pollutants. There are different types of pollution based on the origin and behavior of pollutants.

Firstly, primary pollutants are substances that directly enter the air from a source. Examples include sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and chlorofluorocarbons (CFCs). On the other hand, secondary pollutants are not emitted directly but form as a result of reactions among primary pollutants in the atmosphere. Ozone (O₃) and Peroxy Acetyl Nitrate (PAN) are examples of secondary pollutants.

Pollutants can also be categorized based on their degradability. Biodegradable pollutants are materials such as sewage, clothes, paper, and wood that can be broken down by microbial activities. Non-biodegradable pollutants, on the other hand, cannot be decomposed by microorganisms. Examples include aluminum utensils, DDT, glass, and plastic materials.

To raise awareness about environmental issues, *World Environment Day* is celebrated globally on June 5th, while *Earth Day* is observed on April 22nd each year.

Air pollution

Air pollution refers to undesirable changes in the air that have adverse effects on the environment and the living organisms within it. It can be caused by two main types of pollutants:

Particulate Pollutants: These include metallic particles, dust particles, soot, aerosols, and smoke.

Gaseous Pollutants: These include carbon dioxide (CO₂), nitrogen dioxide (NO₂), hydrogen sulfide (H₂S), and sulfur dioxide (SO₂).

The effects of air pollution are significant and encompass various aspects:

Respiratory Ailments: Air pollution contributes to respiratory diseases such as asthma and cancer. It also increases the rate of transpiration in plants. Peroxy Acetyl Nitrate (**PAN**) inhibits photosynthesis by disrupting the water-splitting process during the Hill reaction that occurs in the presence of light.

Carbon Monoxide: One of the main pollutants in air pollution is carbon monoxide. It reduces the capacity of hemoglobin in the blood to bind with oxygen, leading to the death of organisms.

Acid Rain: The burning of fossil fuels releases nitrogen and sulfur oxides, along with carbon dioxide and carbon monoxide. These oxides, when combined with water, form sulfuric acid (H_2SO_4). Similarly, nitrogen dioxide (NO_2) reacts with water to form nitric acid (HNO_3). These gases, present as pollutants in the air, combine with rainwater and result in acid rain. The presence of SO_2 damages the membrane systems of plants, increases soil and water acidity, and affects living organisms. Acid rain also causes skin diseases.

Lichen Sensitivity: Lichens are particularly sensitive to SO_2 , making them useful indicators of pollution levels.

Notably, the Mathura oil refinery and other industries that utilize fossil fuels release high levels of SO_2 . When this mixes with rainwater, the resulting acid rain damages the marble stone of the Taj Mahal.

Measures to control air pollution include the following:

Electrostatic Precipitator: This device is used to remove particulate matter from the exhaust of thermal power plants.

Scrubber: Scrubbers are employed to eliminate harmful gases, such as sulfur dioxide (SO_2), from industrial exhausts.

Catalytic Converter: Automobiles are equipped with catalytic converters to reduce emissions of poisonous gases like carbon monoxide (CO) and nitrogen dioxide (NO_2).

Case Study:

a) **Controlling Vehicular Air Pollution in Delhi:** In 2002, the Supreme Court of India mandated the conversion of the entire fleet of public transport vehicles, including buses and auto-rickshaws, to operate on Compressed Natural Gas (CNG) in Delhi. This measure aimed to reduce air pollution in the city.

b) **Auto Fuel Policy:** The Government of India has implemented measures to mitigate vehicular pollution in cities through the enforcement of Euro III standards for vehicles. These standards specify limits on emissions to reduce air pollution caused by automobiles.

Noise Pollution

Noise pollution refers to the presence of high-intensity or loud noise that adversely affects the environment. The intensity of sound is measured using a unit called a **decibel (dB)**. A noise level of 80 dB is generally considered tolerable for human beings, while sound levels exceeding **150 dB** can cause permanent hearing impairment.

To address noise pollution, various control measures can be implemented:

Use of Sound Absorbent Material: The use of sound-absorbing materials in buildings helps to reduce the reflection and propagation of noise, thus minimizing its impact on the surroundings.

Noise Muffling: Noise can be suppressed by implementing measures such as planting more trees, which act as natural sound barriers and absorb sound waves, reducing noise propagation.

Creation of Horn-Free Zones: Designating horn-free zones around hospitals and schools helps to maintain a peaceful environment and prevent unnecessary noise disturbances in areas where silence is crucial.

Regulation of Sound-Producing Activities: Ensuring adherence to permissible sound levels for activities such as bursting crackers and using loudspeakers helps to prevent excessive noise pollution.

It is worth noting that the **Air Prevention and Control of Pollution Act, 1981** was amended in **1987** to include noise as an air pollutant, recognizing the significance of addressing noise pollution alongside other forms of air pollution.

Water Pollution

Water pollution refers to any undesirable changes in the physical, chemical, and biological properties of water, resulting in adverse effects on the environment and living organisms.

The main sources of water pollution include:

Household Detergents: Compounds found in household detergents, such as phosphates, nitrates, alkanes, benzene, and sulphonates, can contribute to water pollution.

Sewage: Waste effluent from residential areas, sewage, significantly increases the Biological Oxygen Demand (BOD) of water due to the presence of organic matter. This leads to the death of aquatic organisms, including fish and submerged plants.

Pesticides: Agricultural chemicals like pesticides, such as DDT, can accumulate in water bodies. These chemicals enter the food chain and increase in concentration at various trophic levels, posing toxicity risks to organisms. This phenomenon is known as **biological magnification**. Additionally, the excessive nutrients in water can cause algal blooms, a rapid growth of free-floating algae called phytoplankton. Nutrient enrichment of water, known as **eutrophication**, accelerates the natural aging process of lakes.

Industrial Waste: Improper disposal of industrial waste can pollute rivers and other water bodies.

Biological Oxygen Demand (BOD) is used to measure the pollution level of water and indicates the biological activity of microbes in water bodies. *Higher BOD levels indicate higher water pollution.* Drinking water typically has a BOD level of less than 1 ppm.

Effects of water pollution include:

Minamata Disease: High concentrations of mercury (Hg) can lead to Minamata disease in humans.

Itai-Itai Disease: Excessive exposure to cadmium (Cd) can cause Itai Itai disease.

Blue-Baby Syndrome: Nitrate levels exceeding permissible limits in water can result in blue-baby syndrome or methemoglobinemia in humans.

Black Foot Diseases: The presence of excess arsenic can lead to black foot diseases.

Outbreak of Diseases: Improper sewage disposal without adequate treatment can trigger outbreaks of serious diseases, including jaundice and cholera.

Measures to control water pollution include:

- Reduced use of agricultural chemicals.
- Proper treatment of sewage before its discharge into water bodies.

Solid waste

Solid waste refers to the materials that are discarded as trash. It encompasses various sources, including:

- Municipal solid wastes:** These include items like paper and leather that are commonly generated from households.
- Industrial wastes:** Industrial scraps and fly ash are examples of solid waste produced by industries.
- Hospital wastes:** Disinfectants, needles, and other medical waste generated by healthcare facilities fall into this category.
- Electronic wastes:** Electronic waste, such as mobile phones and computer chips, is another significant source of solid waste.

D. **Defunct ships:** Containers and machinery parts from decommissioned ships contribute to solid waste.

Methods of Solid Waste Disposal include:

Open burning: Some waste is disposed of through open burning, a method aimed at reducing its volume. However, this practice can have negative environmental consequences.

Sanitary landfills: Waste is deposited in trenches and covered with soil in sanitary landfills, which are designed to minimize the impact on the surrounding environment.

Rag pickers (Kabadiwallas): Individuals known as rag pickers or Kabadiwallas play a role in waste management by sorting and separating waste into reusable and recyclable categories.

Recycling of e-wastes: Electronic waste is recycled in an environmentally friendly manner to recover valuable materials and minimize environmental hazards associated with improper disposal.

Incineration: Incineration is employed for the disposal of hospital waste, as it helps prevent the spread of infections.

These methods aim to manage solid waste effectively, promoting waste reduction, recycling, and proper disposal to minimize the environmental impact of solid waste accumulation.

Agrochemicals, used to boost crop productivity after the Green Revolution, can have adverse effects. They are **toxic** to non-target organisms and contribute to soil and water pollution. The excessive use of these chemicals can disrupt ecosystems, contaminate soil, and pollute water bodies. It is crucial to promote sustainable agricultural practices that minimize agrochemical usage and prioritize environmental protection.

Radioactive Pollution

Radioactive pollution can occur due to improper disposal of radioactive waste and leakage of radioactive materials from power plants.

This type of pollution has harmful effects, including:

Genetic Mutations: Radiation emitted by nuclear waste can lead to a high rate of mutations, which can result in various disorders, including cancer.

Lethal Effects: At high doses, nuclear radiation can be lethal to living organisms.

Radioactive Waste Management

To ensure safe disposal of radioactive waste, it is important to follow proper procedures. This involves pre-treating the waste and storing it in shielded containers, which are then buried deep within rocks, approximately 500 meters below the Earth's surface.

Greenhouse Effect

The greenhouse effect is a natural process that contributes to the heating of the Earth's surface and atmosphere. It occurs when greenhouse gases, such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and water vapor, trap heat in the atmosphere.

Global Warming

Global warming refers to the increase in the average temperature of the Earth's atmosphere, primarily caused by the buildup of greenhouse gases and factors like deforestation. Some effects of global warming include:

Climate Change: Over the past three decades, there has been a 0.6°C increase in the average global temperature, leading to changes in climate patterns.

Rising Sea Levels: Melting polar ice caps contribute to the rise in sea levels, posing risks to coastal areas.

Ozone Layer Depletion: Air pollution contributes to the thinning of the ozone layer, which protects the Earth from harmful ultraviolet radiation.

Controlling Global Warming

Efforts to control global warming include:

Reduced Fossil Fuel Usage: Decreasing the reliance on fossil fuels, which are major sources of greenhouse gas emissions.

Improved Energy Efficiency: Enhancing energy usage efficiency to reduce overall energy consumption and associated greenhouse gas emissions.

Forest Conservation: Reducing deforestation and promoting reforestation to absorb carbon dioxide from the atmosphere.

International Initiatives: Collaborative efforts among nations to curb greenhouse gas emissions, with a particular focus on substances like **chlorofluorocarbons (CFCs)** that deplete the ozone layer.

By implementing these measures, we can mitigate the impacts of global warming and work towards a more sustainable future.

Ozone Depletion

The ozone layer, located in the **stratosphere**, plays a crucial role in protecting life on Earth from harmful **ultraviolet (UV) rays** emitted by the sun. However, since 1980, the thickness of the ozone layer has been decreasing, leading to the formation of an ozone hole in the stratosphere.

The primary cause of ozone depletion is the presence of **chlorofluorocarbon (CFC) gases**, with Freon being one of the most harmful CFCs. These gases are commonly used in refrigerators, air conditioners, aerosol sprays, and other products.

Substances that react with ozone and contribute to its depletion are known as ozone-depleting substances. The thinning of the ozone layer allows harmful UV radiation to reach the Earth's surface.

Harmful Effects of UV Rays

The absence of ozone allows UV-B rays to be absorbed preferentially by the DNA and proteins of living organisms.

The high energy of these rays can break chemical bonds within these molecules, resulting in the following harmful effects:

- DNA Damage and Mutation
- Skin Cell Damage and Premature Aging
- Increased Risk of Various Types of Cancer
- Inflammation of the Cornea, Snow Blindness, and Cataracts

Control of Ozone Depletion

The **Montreal Protocol**, an international treaty signed in **1987** in Montreal, Canada, aimed to control the emissions of ozone-depleting substances. Since then, several other protocols have been established to further regulate the emission of CFCs and other chemicals contributing to ozone depletion.

Through these international efforts and regulations, progress has been made in reducing the use of ozone-depleting substances and safeguarding the ozone layer. Continued adherence to these protocols is crucial to preserve and restore the ozone layer for the well-being of our planet and its inhabitants.

Degradation by Improper Resource Utilization and Maintenance

The degradation of natural resources can occur not only through the action of pollutants but also as a result of improper resource utilization practices.

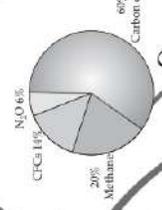
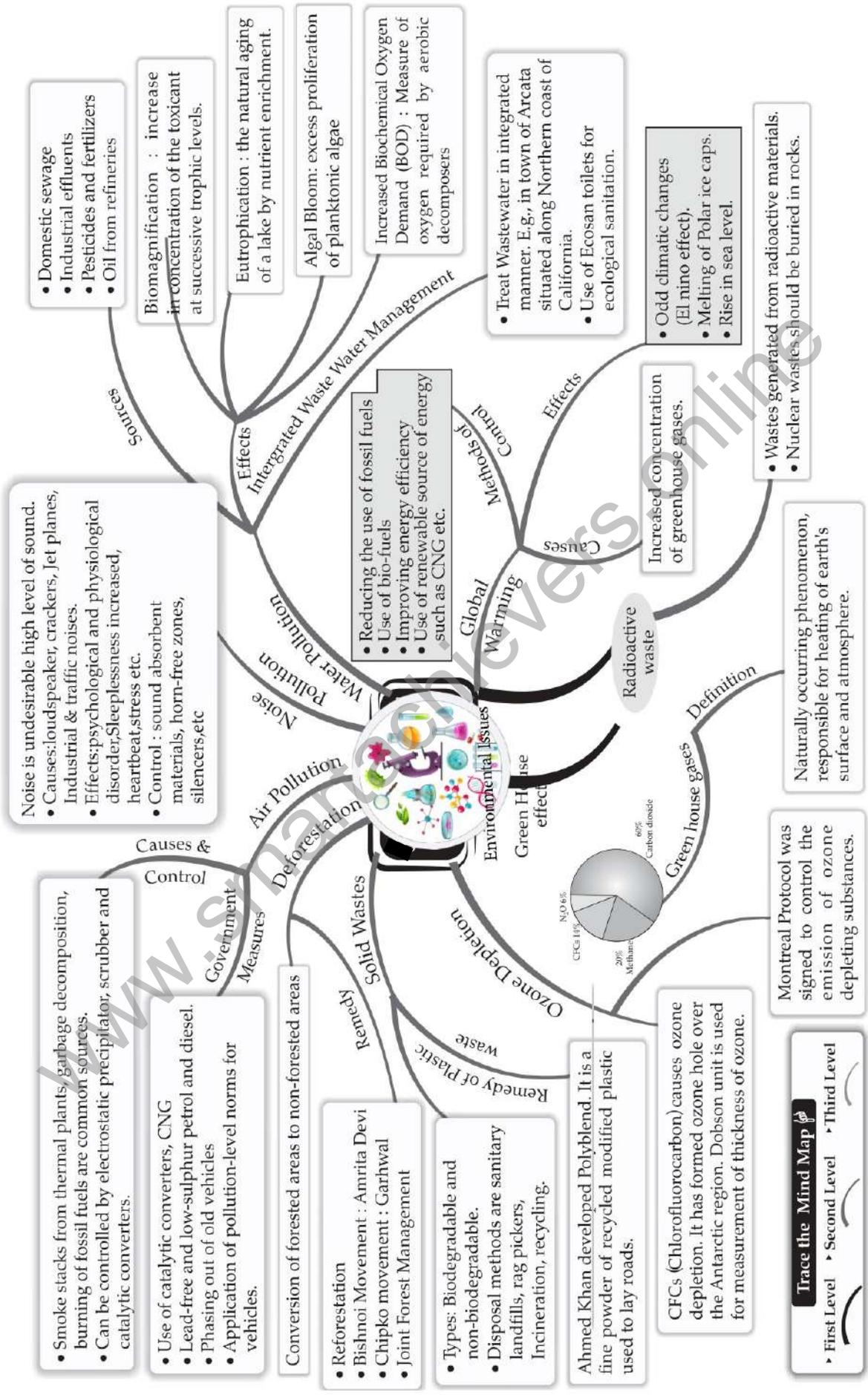
Soil Erosion and Desertification: Human activities such as overcultivation, unrestricted grazing, deforestation, and poor irrigation practices contribute to soil erosion. The topsoil, which is the most fertile layer, takes centuries to form. Additionally, increased urbanization has led to the problem of desertification, where once-productive land becomes desert-like.

Waterlogging and Soil Salinity: Improper irrigation practices without proper water drainage can lead to waterlogging in the soil. This not only affects crop growth but also draws salts to the soil surface, resulting in soil salinity. The accumulation of salts near plant roots or on the land surface hampers plant growth and reduces productivity.

Deforestation: Deforestation refers to the conversion of forested areas into non-forested areas. Tropical regions have lost approximately 40% of their forests, while temperate regions have lost only 1%. Deforestation is driven by various factors, including urbanization, overgrazing by animals, forest fires, demand for wood and other forest products, and slash-and-burn agriculture (known as Jhum Cultivation in the North-Eastern States of India).

Reforestation is an essential strategy for restoring deforested areas. It involves the process of planting trees to recreate forests that were previously removed. While natural reforestation can occur, human efforts can accelerate the process by actively planting more trees.

By addressing these improper resource utilization practices and implementing sustainable management techniques, we can mitigate the degradation of natural resources and ensure their long-term preservation.



Trace the Mind Map

- First Level
- Second Level
- Third Level

8. Which of the following pairs is mismatched?

- a) Biomass burning – Release of CO₂ b) Fossil fuel burning – Release of CO₂
c) Nuclear power – Radioactive wastes d) Solar energy – Greenhouse effect

9. Consider the following statements:

- I. Soil without a vegetation cover is eroded by both wind and water.
II. Excessive irrigation results in waterlogging of soil.
III. Increased salt concentration damages agriculture.

Which of the statements given above are correct?

- a) I and II b) I and III c) II and III d) I, II, and III

10. In India, the Air Prevention and Control of Pollution Act came into force in _____, but was amended in _____ to include _____ as an air pollutant.

- A) A: 1980, B: 1986, C: water b) A: 1981, B: 1987, C: noise
c) A: 1982, B: 1988, C: radioactive d) A: 1983, B: 1989, C: soil

11. Which method is used to remove particulate matter present in the exhaust of a thermal power plant?

- a) Wet scrubbers b) Absorption c) Electrostatic precipitator d) Gravitational method

12. The primary cause of pollution in metropolitan cities is:

- a) Burning of fossil fuels b) Water plants c) Domestic products d) None of these

13. The Chipko movement (1974) is a renowned eco-development program initiated by Sunder Lal Bahuguna in Tehri Garhwal (Uttarakhand). It is associated with:

- A) Plant conservation b) Deforestation c) Reforestation d) Afforestation

14. Which of the following is the most efficient device for eliminating particulate matter from industrial emissions?

- a) Cyclonic separators b) Trajectory separators c) Pyrolysis d) Electrostatic precipitator

15. The Kyoto Protocol is related to:

- a) Ozone layer depletion
- b) Greenhouse effect
- c) Water pollution
- d) Conservation of wildlife

16. _____ refers to an undesirable change in the physical, chemical, or biological characteristics of air, land, water, or soil.

- a) Pollution
- b) Ecological disturbance
- c) Ecological deterioration
- d) Adulteration

17. For optimal ecological balance, the land mass of a country in plains should be covered with forests to the extent of:

- a) 23%
- b) 33%
- c) 44%
- d) 35%

18. Desertification has become a major problem due to:

- a) Decreased natural resources
- b) Increased urbanization
- c) Increased population
- d) All of the above

19. Why is CNG considered a better fuel than diesel or petrol?

- I. CNG burns most efficiently without leaving any unburnt residue.
- II. CNG is cheaper than petrol or diesel.
- III. CNG cannot be siphoned off by thieves and adulterated like petrol or diesel.

Which of the statements given above are correct?

- a) I and II
- b) I and III
- c) II and III
- d) I, II, and III

20. A eutrophicated lake has a _____ BOD (Biochemical Oxygen Demand).

- a) Lower
- b) Higher
- c) Dependent on climate
- d) May be lower or higher

21. The sewage treatment process that involves recycling a portion of the decomposer bacteria present in the waste back into the beginning of the process is called:

- A) Cyclic treatment
- b) Primary treatment
- c) Activated sludge treatment
- d) Tertiary treatment

22. Consider the following statements about the harmful effects of radioactive pollution:

- I. Radiation from nuclear waste causes mutations at a high rate.
- II. At high doses, nuclear radiation is lethal.
- III. At low doses, radiation causes disorders and cancer.

Which of the statements given above are correct?

- a) I and II
- b) I and III
- c) II and III
- d) All of these

23. The primary components of photochemical smog formed in congested metropolitan cities are:

- a) Ozone, peroxyacetyl nitrate, and Nox
- b) Smoke, peroxyacetyl nitrate, and SO₂
- c) Hydrocarbon, SO₂, and CO₂
- d) Hydrocarbon, ozone, and SO₂

24. If there were no greenhouse effect, the average temperature at the Earth's surface would be:

- a) 15°C
- b) -18°C
- c) -6°C
- d) 20°C

25. The disease caused by consuming fish contaminated with mercury compounds from industrial waste is known as:

- a) Bright's disease
- b) Minamata disease
- c) Hashimoto's disease
- d) Osteosclerosis

26. The decline in the population of reptiles and birds is primarily caused by:

- a) DDT
- b) Biofertilizers
- c) Bioinsecticides
- d) Sewage

27. Consider the following statements regarding deforestation:

- I. Deforestation is the removal, decrease, or deterioration of forest cover in an area.
- II. Deforestation leads to soil erosion.
- III. Deforestation often causes flash floods.
- IV. Deforested areas can be used for various purposes such as cropland, industrial areas, residential areas, fallow land, etc.

Which of the statements given above are correct?

- a) I, II, and III b) II, III, and IV c) I, III, and IV d) I, II, III, and IV

28. The increase in the concentration of a toxicant at successive trophic levels is called:

- a) Eutrophication b) Accelerated eutrophication
c) Biomagnification d) Cultural eutrophication

29. In the town of Arcata, situated on the northern coast of _____, an integrated wastewater treatment process was developed with the help of biologists from _____.

- A) A-Florida; B-Barry University
b) A-California; B-Humboldt State University
c) A-Florida; B-Abilene Christian University
d) A-California; B-Becker University

30. Secondary sewage treatment mainly involves a:

- a) Mechanical process b) Chemical process
c) Biological process d) Physical process

31. Cadmium pollution is associated with which of the following diseases?

- a) Minamata b) Pneumoconiosis c) Anemia d) Itai-itai

32. The pollution of pesticides leads to thinning of bird eggshells due to the disturbance of:

- a) Calcium metabolism b) Phosphorus metabolism
c) Sodium metabolism d) Potassium metabolism

33. Which of the following are the main harmful effects of deforestation?

- I. Increase in carbon dioxide concentration in the atmosphere
- II. Loss of biodiversity due to habitat destruction
- III. Disturbance in the hydrologic cycle
- IV. Desertification

Which of the statements given above are correct?

- a) I, II, and III b) II, III, and IV c) I, III, and IV d) I, II, III, and IV

34. What is the meaning of Jhum cultivation?

- a) Cultivation of neem trees b) Cultivation of medicinal plants
c) Tribal methods of shifting cultivation d) Cultivation of timber plants

35. Which of the following is not a greenhouse gas?

- a) Water vapor b) Carbon monoxide c) Methane d) Oxygen

36. Minamata disease occurs in which country?

- a) Japan b) Australia c) India d) China

37. In an area where DDT had been extensively used, why did the bird population decline significantly?

- a) Snakes were feeding exclusively on birds b) Many of the birds' eggs laid did not hatch
c) Birds stopped laying eggs d) None of the above

38. What does the concept of Joint Forest Management (JFM) involve?

- a) Working in close association with local communities for protecting and managing forests for mutual benefits
b) Conservation of forests and agricultural land by NGOs
c) Conservation of forests and agricultural land by the state government
d) Conservation of forests and agricultural land by local communities

39. According to the Kyoto Protocol, major nations agreed to reduce the concentration of greenhouse gases by which year?

- a) 2008 b) 2010 c) 2012 d) 2018

40. This pollutant causes burning sensation of throat and eyes and vomiting sensation.

- a) Hydrogen sulphide b) Sulphur c) Hydrogen cyanide d) Arsenic substances

41. Drinking mineral water with very low levels of pesticides (about 0.02 ppm) for long periods may lead to:

- a) Development of immunity against mosquitoes
b) Cause leukemia (blood cancer) in most people
c) Cause cancer of the intestine
d) Accumulation of pesticide residues in body fat

42. What was the major goal of the green revolution?

- a) Decrease the use of modern farm equipment b) Decrease population growth
c) Increase agricultural production d) Increase population growth

43. In a scrubber, the exhaust is passed through:

- a) Spray of water b) Spray of lime c) Both (a) and (b) d) Spray of hot water

44. During daytime, the sound level in a silent zone is approximately:

- a) 50 dB b) 70 dB c) 20 dB d) 30 dB

45. In India, Jhum cultivation is primarily practiced in:

- a) North-eastern states of India b) Western Ghats of India
c) Gangetic plains d) Deccan Plateau

46. The term used to describe the unfavorable alteration of the environment due to human activities is:

- a) Environmental degradation
- b) Ecological imbalance
- c) Anthropogenic pollution
- d) Human-induced environmental changes

47. What is the main component of photochemical smog?

- a) SO₂
- b) PAN
- c) O₃
- d) Both (b) and (c)

48. Which soil pollutants affect the food chain and food web by killing microorganisms and plants?

- a) Nitrogen oxides
- b) Pathogens
- c) Chemical fertilizers
- d) Pesticides

49. In acid rain, what percentage does SO₂ account for?

- a) 70%
- b) 100%
- c) 50%
- d) 30%

50. According to the Central Pollution Control Board (CPCB), particles that cause significant harm to human health have a diameter of:

- A) 2.50 micrometers
- b) 5.00 micrometers
- c) 10.00 micrometers
- d) 7.5 micrometers

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Answer

1. Correct answer: c) SO₂ and NO₂

Explanation: Acid rain is caused by the emission of sulfur dioxide (SO₂) and nitrogen dioxide (NO₂) into the atmosphere. These pollutants react with water, oxygen, and other chemicals to form sulfuric acid and nitric acid, which then fall to the Earth's surface as acid rain.

2. Correct answer: c) Unwanted sound

Explanation: Noise is defined as unwanted or excessive sound that can be irritating, disruptive, or harmful to human health. It refers to sounds that are not desired or intended and can cause discomfort, stress, or hearing damage.

3. Correct answer: d) Both (a) and (c) – Algal bloom and Eutrophication

Explanation: Excessive nutrients, such as nitrogen and phosphorus, from domestic sewage can cause the rapid growth of free-floating algae, known as an algal bloom. This excessive growth can deplete oxygen levels in water bodies, leading to eutrophication, a process in which the water becomes enriched with nutrients and can harm .

4. Correct answer: d) Dumping in sealed containers

Explanation: High-level radioactive waste, which is highly hazardous and long-lasting, needs to be managed carefully. One method of management is to store and dispose of the waste in sealed containers that prevent the release of radiation and ensure long-term containment.

5. Correct answer: c) A: plastic; B: Kolkata

Explanation: Polyblend, a type of plastic, is mixed with bitumen to create a plastic-modified asphalt mixture used in road construction. Kolkata is mentioned as the location where this practice is employed.

6. Correct answer: b) Lead

Explanation: Lead is a highly hazardous metal pollutant present in automobile exhaust, particularly in older vehicles that used leaded gasoline. Lead emissions can contribute to air pollution and pose health risks, especially to children and vulnerable populations.

7. Correct answer: b) CO₂

Explanation: Carbon dioxide (CO₂) is primarily responsible for the greenhouse effect. It is a major greenhouse gas that traps heat in the Earth's atmosphere, contributing to global warming and climate change.

8. Correct answer: c) Nuclear power – Radioactive wastes

Explanation: The pair “Nuclear power – Radioactive wastes” is a mismatch because nuclear power generation produces radioactive waste, which needs to be carefully managed and stored to prevent environmental contamination and health hazards.

9. Correct answer: d) I, II, and III – All statements are correct.

Explanation: All the statements are correct. Soil without vegetation cover is prone to erosion by wind and water. Excessive irrigation can lead to waterlogging, where the soil becomes saturated with water and adversely affects plant growth. Increased salt concentration in the soil can result in salinization, which damages agricultural productivity.

10. Correct answer: b) A: 1981, B: 1987, C: noise

Explanation: The Air Prevention and Control of Pollution Act was enacted in India in 1981. It was later amended in 1987 to include noise as an air pollutant, recognizing the harmful effects of excessive noise pollution on human health and the environment.

11. Correct answer: c) Electrostatic precipitator

Explanation: Electrostatic precipitators are commonly used to remove particulate matter from the exhaust of thermal power plants. They use an electric charge to attract and collect the particles, allowing cleaner emissions to be released into the atmosphere.

12. Correct answer: a) Burning of fossil fuels

Explanation: The burning of fossil fuels, such as coal, oil, and gas, is a primary cause of pollution in metropolitan cities. The combustion of these fuels releases pollutants, including greenhouse gases, particulate matter, and harmful chemicals, leading to air pollution and its associated health and environmental impacts.

13. Correct answer: d) Afforestation

Explanation: The Chipko movement, which began in 1974, is associated with afforestation and the conservation of forests. It involved local communities in Uttarakhand hugging (chipko) trees to prevent their felling and raise awareness about the importance of forests for ecological balance, water conservation, and livelihoods.

14. Correct answer: d) Electrostatic precipitator

Explanation: Electrostatic precipitators are considered the most efficient devices for eliminating particulate matter from industrial emissions. They use electrostatic forces to attract and remove particles from the exhaust gases, helping to reduce air pollution from industrial sources.

15. Correct answer: b) Greenhouse effect

Explanation: The Kyoto Protocol is an international environmental agreement adopted in 1997. It aims to address the issue of global climate change by setting targets for the reduction of greenhouse gas emissions, particularly from developed countries, and promoting measures to mitigate climate change impacts.

16. Correct answer: a) Pollution

Explanation: Pollution refers to the introduction of harmful or undesirable substances or energy into the environment, leading to an undesirable change in the physical, chemical, or biological characteristics of air, land, water, or soil. It can have detrimental effects on ecosystems, human health, and the overall quality of the environment.

17. Correct answer: b) 33%

Explanation: For optimal ecological balance, it is recommended that the land mass of a country in plains should be covered with forests to the extent of approximately 33%. Forests play a crucial role in maintaining biodiversity, regulating climate, conserving water resources, and providing various ecological services.

18. Answer: d) All of the above

Explanation: Desertification is caused by a combination of factors. Decreased natural resources, such as water scarcity and soil erosion, contribute to the expansion of desert areas. Increased urbanization leads to the destruction of natural habitats and alteration of ecosystems, which can exacerbate desertification. Increased population puts pressure on land and resources, leading to unsustainable agricultural practices and overexploitation, further contributing to desertification.

19. Answer: d) I, II, and III

Explanation: CNG (Compressed Natural Gas) is considered a better fuel for several reasons. First, it burns most efficiently without leaving unburnt residue, resulting in lower emissions of pollutants. Second, CNG is generally cheaper than petrol or diesel, offering cost savings for consumers. Third, CNG cannot be easily stolen or adulterated like petrol or diesel, making it more secure and reducing the risk of fuel adulteration.

20. Answer: b) Higher

Explanation: In a eutrophicated lake, excessive nutrient enrichment, particularly nitrogen and phosphorus, leads to increased algal growth and subsequent decomposition of organic matter. This decomposition process consumes more oxygen, resulting in a higher Biochemical Oxygen Demand (BOD). Therefore, a eutrophicated lake typically has a higher BOD.

21. Answer: c) Activated sludge treatment

Explanation: Activated sludge treatment is a sewage treatment process where a portion of the decomposer bacteria (activated sludge) present in the waste is recycled back into the beginning of the treatment process. This recycling helps maintain a stable and efficient microbial population for effective sewage treatment.

22. Answer: b) I and III

Explanation:

- I. Radiation from nuclear waste can cause mutations at a high rate, leading to genetic disorders and abnormalities.
- II. At high doses, nuclear radiation is indeed lethal and can cause severe damage to living organisms.
- III. Even at low doses, radiation exposure can have detrimental effects on living organisms, including the development of disorders and an increased risk of cancer. Therefore, statements I and III are correct.

23. Answer: a) Ozone, peroxyacetyl nitrate, and Nox

Explanation: The primary components of photochemical smog formed in congested metropolitan cities include ozone (O₃), peroxyacetyl nitrate (PAN), and nitrogen oxides (Nox). These pollutants are produced through chemical reactions involving sunlight, nitrogen oxides, volatile organic compounds, and oxygen.

24. Answer: b) -18°C

Explanation: The greenhouse effect is responsible for trapping heat in the Earth's atmosphere, keeping the planet warmer than it would be otherwise. Without the greenhouse effect, the average temperature at the Earth's surface would be significantly colder. The estimated average temperature without the greenhouse effect is around -18°C.

25. Answer: b) Minamata disease

Explanation: Minamata disease is a neurological disorder caused by the ingestion of fish and shellfish contaminated with methylmercury.

26. Answer: a) DDT

Explanation: The pesticide DDT (dichloro-diphenyl-trichloroethane) has been a significant cause of decline in the population of reptiles and birds. DDT was widely used in the past for pest control but had harmful effects on the reproductive systems of these animals, leading to population declines and thinning of eggshells.

27. Answer: d) I, II, III, and IV

Explanation:

- I. Deforestation refers to the removal, decrease, or deterioration of forest cover in an area.
- II. Deforestation can lead to soil erosion, as the tree cover that helps hold soil in place is removed.
- III. Deforestation often disrupts natural water flow and can contribute to flash floods in certain areas.
- IV. Deforested areas can be used for various purposes, such as cropland, industrial areas, residential areas, or fallow land. All of these statements are correct.

28. Answer: c) Biomagnification

Explanation: Biomagnification refers to the process in which the concentration of a toxic substance increases as it moves up the food chain. This occurs because organisms at higher trophic levels consume larger amounts of contaminated food, resulting in the accumulation of the toxicant in their tissues.

29. Answer: b) A-California; B-Humboldt State University

Explanation: Arcata is located on the northern coast of California, and an integrated wastewater treatment process was developed there with the assistance of biologists from Humboldt State University.

30. Answer: c) Biological process

Explanation: Secondary sewage treatment primarily involves a biological process. It uses microorganisms to break down organic matter in wastewater, promoting the decomposition of pollutants. This process is typically carried out in an aerated environment, such as an activated sludge system.

31. Answer: d) Itai-itai

Explanation: Cadmium pollution is associated with the disease called Itai-itai, which is a type of skeletal disorder caused by long-term exposure to cadmium. Itai-itai disease was first identified in Japan and is characterized by severe pain in the joints and softening of the bones.

32. Answer: a) Calcium metabolism

Explanation: Pesticide pollution can lead to the thinning of bird eggshells due to the disturbance of calcium metabolism. Some pesticides, such as those belonging to the group of organochlorines, can interfere with the availability and absorption of calcium in birds, resulting in weakened eggshells.

33. Answer: d) I, II, III, and IV

Explanation:

- I. Deforestation leads to an increase in carbon dioxide concentration in the atmosphere as trees, which absorb carbon dioxide, are removed.
- II. Deforestation causes habitat destruction, leading to a loss of biodiversity.
- III. Deforestation disrupts the hydrologic cycle by altering patterns of evapotranspiration and rainfall.
- IV. Deforestation can contribute to desertification, the expansion of desert areas into once fertile land. All of these statements are correct.

34. Answer: c) Tribal methods of shifting cultivation

Explanation: Jhum cultivation refers to a traditional agricultural practice commonly used by tribal communities, particularly in hilly and forested regions. It involves the clearing of a patch of land by cutting and burning vegetation, followed by cultivation for a few years until the soil fertility declines. After that, the cultivators move to a new area and repeat the process. It is a form of shifting cultivation practiced by indigenous tribes.

35. Answer: d) Oxygen

Explanation: Oxygen (O_2) is not considered a greenhouse gas. Greenhouse gases are gases that can trap heat in the Earth's atmosphere and contribute to the greenhouse effect. Examples of greenhouse gases include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), and others. Oxygen is a vital component of the atmosphere but does not have the same warming effect as greenhouse gases.

36. Answer: a) Japan

Explanation: Minamata disease is a neurological syndrome caused by the ingestion of seafood contaminated with methylmercury compounds. It was first discovered in the city of Minamata, Japan, in the 1950s due to industrial pollution. The disease is characterized by severe neurological symptoms and can lead to permanent damage or death.

37. Answer: b) Many of the birds' eggs laid did not hatch

Explanation: The decline in the bird population in an area where DDT had been extensively used can be attributed to the fact that many of the birds' eggs laid did not hatch. DDT and its breakdown products accumulate in the environment and can cause thinning of bird eggshells, making them more susceptible to cracking during incubation. This led to a decline in reproductive success and a significant decrease in bird populations.

38. Answer: a) Working in close association with local communities for protecting and managing forests for mutual benefits

Explanation: Joint Forest Management (JFM) involves a collaborative approach in which local communities and forest authorities work together to protect and manage forests. It aims to involve communities in decision-making processes, sustainable resource utilization, and conservation efforts. The idea is to ensure the participation of local communities in forest management, benefit sharing, and the promotion of sustainable practices.

39. Answer: c) 2012

Explanation: According to the Kyoto Protocol, major nations agreed to reduce the concentration of greenhouse gases by the year 2012. The Kyoto Protocol was an international treaty aimed at combating climate change. It set binding emission reduction targets for signatory countries during the period from 2008 to 2012.

40. Answer: b) Sulphur

Explanation: Sulphur is a pollutant that, when released into the atmosphere, can react with other compounds to form Sulphur dioxide (SO_2) and sulphuric acid (H_2SO_4). These substances can cause a burning sensation in the throat and eyes and can lead to vomiting. Sulphur pollution is often associated with industrial activities and the burning of fossil fuels.

41. Answer: d) Accumulation of pesticide residues in body.

42.

a) Increase agricultural production

The green revolution aimed to increase agricultural production through the adoption of high-yielding crop varieties, modern farming techniques, and the use of fertilizers and pesticides. It sought to address the challenges of food scarcity by improving crop yields and reducing hunger and poverty in developing countries.

43. In a scrubber, the exhaust is passed through:

- b) Both (a) and (b)

Scrubbers are air pollution control devices used to remove pollutants from industrial exhaust gases. They typically involve passing the exhaust through a spray of water (option a) or a spray of lime (option b), or sometimes a combination of both. The water or lime reacts with the pollutants, such as sulfur dioxide (SO₂), to remove them from the exhaust before it is released into the atmosphere.

44. During daytime, the sound level in a silent zone is approximately:

- c) 20 dB

A silent zone is an area where noise levels are regulated and kept low to provide a peaceful environment. During daytime, the sound level in a silent zone is generally around 20 decibels (dB), which is considered a very low level of noise. This ensures minimal disturbance and a tranquil atmosphere in the designated silent zone.

45. In India, Jhum cultivation is primarily practiced in:

- a) North-eastern states of India

Jhum cultivation, also known as shifting cultivation or slash-and-burn agriculture, is primarily practiced in the north-eastern states of India. These states include Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. Jhum cultivation involves clearing a patch of land, burning the vegetation, and then cultivating crops. After a few years, the land is abandoned and left fallow for natural regeneration.

46. The term used to describe the unfavorable alteration of the environment due to human activities is:

- a) Environmental degradation

Environmental degradation refers to the unfavorable alteration or deterioration of the environment caused by human activities. It includes processes such as pollution, deforestation, habitat destruction, soil erosion, and climate change. Human actions can have negative impacts on the environment, leading to degradation and loss of natural resources, biodiversity, and ecosystem services.

47. What is the main component of photochemical smog?

d) Both (b) and (c)

Photochemical smog is a type of air pollution that occurs in urban areas with high levels of sunlight and a high concentration of pollutants. It is primarily composed of two main components: peroxyacetyl nitrate (PAN, option b) and ozone (O_3 , option c). These pollutants are formed through chemical reactions involving nitrogen oxides (NO_x) and volatile organic compounds (VOCs) released from vehicle emissions, industrial processes, and other sources.

48. Which soil pollutants affect the food chain and food web by killing microorganisms and plants?

d) Pesticides

Pesticides are chemical substances used to control or eliminate pests, such as insects, weeds, and fungi, in agricultural and non-agricultural settings. While they can be effective in pest control, some pesticides can be harmful to microorganisms and plants, leading to their death. When these pollutants enter the soil, they can disrupt the food chain and food web by directly or indirectly affecting the organisms that rely on microorganisms and plants for their survival.

49. In acid rain, what percentage does SO_2 account for?

a) 70%

Sulfur dioxide (SO_2) is one of the main pollutants responsible for the formation of acid rain. It is released into the atmosphere through the combustion of fossil fuels, industrial processes, and volcanic eruptions. SO_2 emissions contribute to the acidity of rainwater and it reacts with other compounds.

50. According to the Central Pollution Control Board (CPCB), particles that cause significant harm to human health have a diameter of:

A) 2.50 micrometers

The Central Pollution Control Board (CPCB) sets guidelines and standards for air quality in India. According to their classification, particles that pose a significant risk to human health have a diameter of 2.5 micrometers or smaller. These particles are commonly referred to as PM_{2.5} (Particulate Matter 2.5). PM_{2.5} particles are tiny and can be inhaled deep into the respiratory system, bypassing the body's natural defense mechanisms. They can include various substances such as dust, smoke, soot, and chemicals, and their small size allows them to penetrate the lungs and enter the bloodstream, potentially causing adverse health effects, particularly for individuals with pre-existing respiratory and cardiovascular conditions.