# 11. SOIL POLLUTION

## TEACHING TASK (Page 72 – 74)

### NEET LEVEL QUESTIONS

**Multiple Choice Questions**

**1) What are the major components of soil? Correct**

**Answer: B) Air, water, and organic matter**

**Explanation:** Soil is a complex mixture consisting of minerals, organic matter, air, and water. While sand, silt, and clay (Option C) are part of the mineral component, air, water, and organic matter are broader and more inclusive of soil's essential components.

**2) Which factor influences soil formation? Correct**

**Answer: B) Temperature and rainfall**

**Explanation:** Soil formation is influenced by climate (temperature and rainfall), parent material, topography, biological activity, and time. Human activities, industrialization, and transportation networks may affect soil but are not primary factors in its formation.

**3) What is the significance of soil pH? Correct**

**Answer: D) It influences plant growth and nutrient availability**

**Explanation:** Soil pH affects the availability of nutrients to plants and influences microbial activity, which is critical for plant growth. It does not directly determine soil color, water retention, or mineral presence.

**4) What is the primary cause of soil pollution from agricultural activities? Correct**

**Answer: B) Use of pesticides and fertilizers**

**Explanation:** Excessive use of chemical pesticides and fertilizers in agriculture is a primary source of soil pollution, leading to contamination and nutrient imbalances. Organic fertilizers and tree planting do not typically cause pollution, and soil erosion is a consequence, not a cause.

**5) Which type of waste contributes directly to land pollution? Correct**

**Answer: B) Non-biodegradable waste**

**Explanation:** Non-biodegradable waste, such as plastics and metals, persists in the environment and contributes significantly to land pollution.

Biodegradable and plant waste decompose naturally, while radioactive waste is a specific hazard.

**6) What is a common source of soil pollution from industrial activities? Correct**

**Answer: C) Rupture of underground storage tanks**

**Explanation:** Ruptured underground storage tanks release hazardous substances like petroleum and chemicals into the soil, causing pollution. Pesticides are more associated with agriculture, and effluents/landfills are broader sources.

**7) Which chemicals are commonly involved in soil pollution? Correct**

**Answer: C) Petroleum hydrocarbons and heavy metals**

**Explanation:** Petroleum hydrocarbons (from oil spills) and heavy metals (like lead, cadmium) are common soil pollutants due to their persistence and toxicity. Oxygen, nitrogen, and other options are not typically pollutants.

**8) What type of waste contributes directly to soil fertility but can also lead to imbalance when in excess? Correct**

**Answer: B) Biodegradable waste**

**Explanation:** Biodegradable waste (e.g., organic matter) enhances soil fertility by adding nutrients but can cause imbalances (e.g., nutrient overload) if excessive. Industrial and hazardous wastes are more harmful than beneficial.

**9) What is the consequence of overuse of NPK fertilizers on crop yield? Correct**

**Answer: B) Decreased yield over time**

**Explanation:** Overuse of NPK (nitrogen, phosphorus, potassium) fertilizers leads to soil degradation, nutrient imbalances, and reduced crop yield over time due to soil exhaustion and environmental damage.

**10) Which pesticide, once widely used, caused thin and fragile eggshells in birds due to biomagnification? Correct**

**Answer: A) DDT**

**Explanation:** DDT (Dichlorodiphenyltrichloroethane) is a pesticide known for biomagnification in food chains, leading to thin eggshells in birds, particularly raptors, due to its persistence and toxicity.

**ADVANCED LEVEL QUESTIONS**

**Multi Correct Answer Type:**

**11) What roles do soil microbes play in soil fertility? Correct**

**Answers: A) Convert organic forms of nutrients into inorganic forms, C) Influence nutrient cycles**

**Explanation:** Soil microbes facilitate mineralization, converting organic nutrients into inorganic forms (e.g., ammonium, phosphates) that plants can use, and they drive nutrient cycles (carbon, nitrogen, etc.). They do not significantly decrease soil porosity or release large amounts of $CO_2$ into the atmosphere as a primary role.

**12) Which pollutants contribute to soil pollution through dry deposition on land surfaces? Correct**

**Answers: B) Iron and steel slag, D) Fertilizers and pesticides**

**Explanation:** Iron and steel slag from industrial activities and fertilizers/pesticides from agriculture can settle on land via dry deposition, contributing to soil pollution. Aluminum cans and medical waste are more associated with solid waste pollution.

**Assertion and Reason Type:**

**13) Assertion: Healthy soil is not essential for growing healthy plants.**

**Reason: Soil composition does not affect plant growth. Correct**

**Answer: C) Assertion is true, but Reason is false**

**Explanation:** The assertion is true in specific contexts, as plants can grow in hydroponics or other media without soil. However, the reason is false because soil composition (nutrients, pH, texture) significantly affects plant growth in natural conditions.

**14) Assertion: The indiscriminate use of pesticides, insecticides, and herbicides poses significant environmental and health risks.**

**Reason: Pesticides can persist in the environment, contaminate crops, harm wildlife, and have adverse effects on human health. Correct**

**Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion**

**Explanation:** The assertion is true, as pesticides pose risks to ecosystems and health. The reason correctly explains why, detailing their persistence, contamination, and harmful effects.

**Matrix Matching Type:**

**15) Match the following:**

| S.No | Column I | Column II |
|---|---|---|
| 1. | Industrial waste | q. Fly ash, iron and steel slag, medical and industrial waste |
| 2. | Biodegradable waste | p. Materials that can be broken down by microbes into harmless substances |
| 3. | Non-biodegradable waste | r. Substances that cannot be easily degraded and contribute to land pollution |
| 4. | Disposal of oil and fuel | s. Oil and fuel dumping directly onto the soil, leading to contamination |

**Explanation:**

Industrial waste includes fly ash, slag, and medical waste.

Biodegradable waste is broken down by microbes.

Non-biodegradable waste persists and pollutes.

Oil and fuel disposal directly contaminates soil.

**Comprehension Type:**

**16) What is the role of soil microbes in the cycles of carbon, nitrogen, sulfur, and phosphorus? Correct**

**Answer: B) They convert organic forms of these elements into inorganic forms**

**Explanation:** Soil microbes drive mineralization, converting organic forms of elements (e.g., proteins, organic sulfur) into inorganic forms (e.g., ammonium, sulfate) that plants can absorb.

**17) What is the process called when soil microbes convert organic forms of elements into their inorganic forms? Correct**

**Answer: C) Mineralization**

**Explanation:** Mineralization is the process by which microbes convert organic matter into inorganic nutrients, essential for nutrient cycling in ecosystems.

## LEARNERS TASK (Page 74 – 76)

**NEET LEVEL QUESTIONS**

**Multiple Choice Questions**

**1) Which pH range is considered suitable for most vegetation? Correct**

**Answer: C) pH 5.5-7.5**

**Explanation:** Most plants thrive in slightly acidic to neutral soil (pH 5.5–7.5), as this range optimizes nutrient availability. Extreme pH levels (too acidic or alkaline) hinder growth.

**2) Which soil property influences water and air movement in the soil? Correct**

**Answer: C) Physical properties**

**Explanation:** Physical properties like texture, structure, and porosity determine water retention and air movement in soil. Chemical and biological properties have indirect effects.

**3) What is the primary factor determining soil quality? Correct**

**Answer: D) Soil properties such as physical, chemical, and biological**

**Explanation:** Soil quality depends on a combination of physical (texture, structure), chemical (pH, nutrients), and biological (microbes, fauna) properties, not just one aspect like color or texture.

**4) Which soil organisms form symbiotic relationships with plant roots? Correct**

**Answer: C) Fungi, particularly mycorrhizae**

**Explanation:** Mycorrhizal fungi form symbiotic relationships with plant roots, enhancing nutrient and water uptake. Bacteria, algae, and protozoa play other roles but are less specific to symbiosis.

**5) What defines soil fertility? Correct**

**Answer: B) Ability to hold water and nutrients**

**Explanation:** Soil fertility is defined by its capacity to retain water and nutrients for plant growth. Color, texture, and pH are contributing factors but not the definition.

**6) What is the main source of municipal solid waste? Correct**

**Answer: B) Household waste**

**Explanation:** Municipal solid waste primarily comes from households (e.g., food scraps, packaging). Industrial, agricultural, and hazardous wastes are distinct categories.

**7) What contributes to soil erosion, leading to soil loss and floods? Correct**

**Answer: A) Deforestation and logging, D) Agricultural expansion and overgrazing**

**Explanation:** Deforestation, logging, agricultural expansion, and overgrazing remove vegetation cover, increasing soil erosion and flood risk. Recycling and urbanization are less direct causes.

**8) What chemicals from industrial waste can contaminate underground soil? Correct**

**Answer: C) Cadmium, chromium, and lead**

**Explanation:** Heavy metals like cadmium, chromium, and lead from industrial waste contaminate soil and groundwater due to their toxicity and persistence.

**9) What contributes to the concentration of toxic chemicals in organisms through biomagnification? Correct**

**Answer: C) Consumption of phytoplankton**

**Explanation:** Biomagnification occurs when toxic chemicals accumulate in organisms higher up the food chain, starting with phytoplankton consumed by small organisms.

**10) What is the primary effect of soil pollution on plant growth and development? Correct**

**Answer: B) Decreased yield**

**Explanation:** Soil pollution reduces nutrient availability, introduces toxins, and impairs plant growth, leading to decreased crop yields.

**ADVANCED LEVEL QUESTIONS**

**Multi Correct Answer Type:**

**11) Which organisms contribute to the biological properties of soil? Correct**

**Answers: A) Earthworms, B) Algae, D) Bacteria**

**Explanation:** Earthworms, algae, and bacteria contribute to soil's biological properties by aiding decomposition, nutrient cycling, and soil structure. Birds have minimal direct impact.

**12) Which statement(s) about the stability of some pesticides is/are true? Correct**

**Answers: B) Their biodegradation may take weeks or even months, D) They persist in the environment**

**Explanation:** Many pesticides are stable, taking weeks/months to biodegrade and persisting in the environment, impacting soil and ecosystems. They do affect soil fertility.

**Assertion and Reason Type:**

**13) Assertion: Climate and topography do not play a significant role in soil formation.**

**Reason: Soil formation is mainly influenced by chemical reactions. Correct**

**Answer: D) Assertion is false, but Reason is true**

**Explanation:** Climate and topography are major factors in soil formation (assertion is false). Chemical reactions (weathering) contribute but are not the sole influence (reason is true).

**14) Assertion: DDT was widely used as an insecticide after World War II but was later banned in most Western countries.**

**Reason: DDT's persistence in the environment, bioaccumulation in food chains, and its harmful effects on wildlife led to its ban. Correct**

**Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion**

**Explanation:** DDT was widely used but banned due to its environmental persistence, bioaccumulation, and harm to wildlife, as explained by the reason.

**Matrix Matching Type:**

**15) Match the following:**

| S.No | Column I | Column II |
|---|---|---|
| 1. | pH below 7 | q. Termed acidic |

| S.No | Column I | Column II |
|---|---|---|
| 2. | Soil that forms foundation for life on Earth | r. Topsoil |
| 3. | Industrial and hospital waste | p. Hazardous solid waste |
| 4. | Aluminum cans, plastics, glass | t. Non-biodegradable waste |

**Explanation:**

pH below 7 is acidic.

Topsoil supports life.

Industrial/hospital waste is hazardous.

Aluminum cans, plastics, and glass are non-biodegradable.

**Comprehension Type:**

**16) What primarily constitutes the bottom layer of the soil? Correct**

**Answer: C) Parent material**

**Explanation:** The bottom layer of soil consists mainly of parent material, which is weathered rock or sediment from which soil forms.

**17) Where does maximum material accumulation occur in the soil layers? Correct**

**Answer: B) The middle layer**

**Explanation:** The middle layer (subsoil) is where maximum material accumulation (e.g., minerals, clay) occurs due to leaching and deposition from the topsoil.

## TEACHING TASK (Page 80 - 82)

**NEET LEVEL QUESTIONS**

**Multiple Choice Questions**

**1) What is a key characteristic that differentiates soil pollution from air and water pollution? Correct**

**Answer: C) Once land is contaminated, it remains polluted unless pollutants are removed**

**Explanation:** Soil pollution persists longer because pollutants are not easily dispersed, unlike air or water, which have natural cleansing mechanisms.

**2) What makes landfill sites and radioactive waste dumps essentially permanent? Correct**

**Answer: B) The long-time plastics and radiation take to degrade and decontaminate**

**Explanation:** Plastics and radioactive materials have extremely long degradation times, making landfills and radioactive dumps persistent pollution sources.

**3) What is a major concern regarding urbanization and industrialization in relation to land use? Correct**

**Answer: C) Reduction in available productive agricultural land**

**Explanation:** Urbanization and industrialization convert agricultural land into built-up areas, reducing land available for farming.

**4) What is a significant risk when polluted land is reused for construction or agriculture without proper cleanup? Correct**

**Answer: C) Exposure of future residents to lingering pollutants**

**Explanation:** Reusing contaminated land without remediation exposes people and crops to toxic pollutants, posing health and environmental risks.

**5) Why is it challenging to attribute health problems like cancer directly to local environmental contamination? Correct**

**Answer: C) Frequent movement of people**

**Explanation:** People's mobility makes it hard to link health issues like cancer to specific contaminated sites, as exposure may occur elsewhere.

**6) Which of the following measures can help prevent soil pollution by restricting construction activities? Correct**

**Answer: A) Limiting construction in environmentally sensitive areas**

**Explanation:** Restricting construction in sensitive areas (e.g., wetlands, forests) prevents soil disturbance and pollution.

**7) What does adopting the 4Rs (Reduce, Reuse, Recover, Recycle) aim to achieve? Correct**

**Answer: B) Minimize solid waste generation**

**Explanation:** The 4Rs aim to reduce waste production and promote sustainable waste management, minimizing environmental impact.

**8) How can soil health and fertility be promoted while reducing dependency on chemical fertilizers? Correct**

**Answer: B) Utilizing bio-fertilizers and organic manures**

**Explanation:** Bio-fertilizers and organic manures enhance soil fertility naturally, reducing the need for chemical fertilizers.

**9) What is the environmental benefit of reusing materials like glass containers and plastic bags? Correct**

**Answer: B) Reduces waste generation**

**Explanation:** Reusing materials reduces the amount of waste sent to landfills, conserving resources and minimizing pollution.

**10) How does reforesting and maintaining grass cover contribute to land sustainability? Correct**

**Answer: B) By controlling land erosion and loss**

**Explanation:** Reforestation and grass cover stabilize soil, reduce erosion, and enhance sustainability by maintaining soil structure.

**ADVANCED LEVEL QUESTIONS**

**Multi Correct Answer Type:**

**11) What are some consequences of urban area effects on soil pollution? Correct**

**Answers: A) Drain clogging, B) Area flooding, C) Public health issues**

**Explanation:** Urbanization leads to soil pollution, causing drain clogging, flooding (due to impermeable surfaces), and public health risks from contaminants. It does not improve water quality.

**12) What are some of the impacts of natural disasters on land pollution? Correct**

**Answers: A) Earthquakes and floods leave behind massive debris, C) Natural disasters often require years to clean up affected areas**

**Explanation:** Natural disasters like earthquakes and floods generate debris, contributing to land pollution, and cleanup can take years. They do not enhance crop productivity.

**Assertion and Reason Type:**

**13) Assertion: Excessive salt accumulation in soil promotes soil erosion.**

**Reason: Salinity management is crucial for maintaining soil health and preventing vegetation loss. Correct**

**Answer: B) Both Assertion and Reason are true, but Reason is NOT the correct explanation for Assertion**

**Explanation:** Excessive salt accumulation (salinization) can degrade soil and reduce vegetation, indirectly promoting erosion (assertion true). The reason is true but does not directly explain erosion.

**14) Assertion: Implementing recycling programs can significantly decrease waste volume.**

**Reason: Recycling conserves natural resources and reduces the energy and environmental impacts associated with manufacturing new products. Correct**

**Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion**

**Explanation:** Recycling reduces waste volume and conserves resources, as explained by the reason.

**Matrix Matching Type:**

**15) Match the following:**

| S.No | Column I | Column II |
|---|---|---|
| 1. | Promotes soil health and fertility | B) Bio-fertilizers |
| 2. | An effective method in hilly areas to prevent rapid runoff of water | C) Terracing |
| 3. | Adopting the 4R | A) Promotes sustainable practices and reduces environmental impact |

**Explanation:**

Bio-fertilizers promote soil health.

Terracing prevents runoff in hilly areas.

The 4Rs (Reduce, Reuse, Recover, Recycle) promote sustainability.

**Comprehension Type:**

**16) What is the primary goal of the mentioned measures? Correct**

**Answer: C) Promoting sustainable practices and safeguarding the environment**

**Explanation:** Reforestation, crop rotation, and mixed cropping aim to enhance soil fertility, reduce erosion, and promote sustainable environmental practices.

**17) How do techniques like crop rotation contribute to the environment? Correct**

**Answer: C) They enhance overall land sustainability and resilience**

**Explanation:** Crop rotation improves soil structure, prevents nutrient depletion, and enhances sustainability and resilience.

## LEARNERS TASK (Page 82 – 84)

**NEET LEVEL QUESTIONS**

**Multiple Choice Questions**

**1) What is a specific effect of lead as a pollutant? Correct**

**Answer: C) Harms human health and impairs children's development**

**Explanation:** Lead is a toxic heavy metal that affects human health, particularly impairing neurological development in children.

**2) Which of the following is a category of the effects of soil pollution? Correct**

**Answer: B) Contamination of the food chain**

**Explanation:** Soil pollution leads to the uptake of toxins by plants, contaminating the food chain. It does not improve air quality or fertility.

**3) What impact does soil pollution have on soil fertility? Correct**

**Answer: B) It reduces fertility due to waterlogging and salinity**

**Explanation:** Soil pollution, including waterlogging and salinization, reduces fertility by altering soil conditions and nutrient availability.

**4) What effect do toxic chemicals in the soil have on plant and animal life? Correct**

**Answer: C) They inhibit plant growth and harm animals**

**Explanation:** Toxic chemicals reduce plant growth by impairing nutrient uptake and harm animals through ingestion or exposure.

**5) Which type of waste is associated with reducing soil fertility and increasing erosion? Correct**

**Answer: A) Industrial wastes**

**Explanation:** Industrial wastes, containing heavy metals and chemicals, reduce soil fertility and contribute to erosion by degrading soil structure.

**6) What does effective solid waste management involve? Correct**

**Answer: B) Collection, transportation, and safe disposal**

**Explanation:** Effective solid waste management includes collecting, transporting, and disposing of waste safely to minimize environmental impact.

**7) What is bioremediation? Correct**

**Answer: B) Using biological processes to clean up contamination**

**Explanation:** Bioremediation uses organisms (e.g., microbes, plants) to degrade or remove contaminants from soil or water.

**8) How can natural disasters contribute to land pollution? Correct**

**Answer: B) By leaving behind massive debris**

**Explanation:** Natural disasters like floods and earthquakes leave debris, contributing to land pollution.

**9) Which method is effective in hilly areas to prevent rapid runoff of water and soil erosion? Correct**

**Answer: C) Terracing**

**Explanation:** Terracing slows water runoff and prevents soil erosion on hilly slopes by creating stepped land surfaces.

**10) What is the benefit of crop rotation in soil conservation? Correct**

**Answer: B) Prevents nutrient depletion and enhances soil structure**

**Explanation:** Crop rotation alternates crops to maintain soil nutrients and improve soil structure, reducing erosion.

**ADVANCED LEVEL QUESTIONS**

**Multi Correct Answer Type:**

**11) What are some effects of agricultural waste on soil pollution? Correct**

**Answers: A) Reduces soil fertility, C) Increases erosion, D) Disrupts soil fauna and flora**

**Explanation:** Agricultural waste (e.g., excess fertilizers, pesticides) reduces fertility, promotes erosion by degrading soil, and disrupts soil organisms. It does not enhance nitrogen fixation.

**12) What are some effective ways to manage solid waste properly? Correct**

**Answers: B) Collection, transportation to suitable sites, and safe disposal methods, C) Deep well injection for hazardous waste**

**Explanation:** Proper waste management includes safe collection, transportation, disposal, and specialized methods like deep well injection for hazardous waste. Incineration is not suitable for all waste types.

**Assertion and Reason Type:**

**13) Assertion: Planting trees is an effective method for soil conservation.**

**Reason: Trees anchor soil with their extensive root systems and provide vegetative cover that acts as a barrier against wind erosion. Correct**

**Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion**

**Explanation:** Planting trees prevents soil erosion by anchoring soil and reducing wind impact, as explained by the reason.

**14) Assertion: Incineration is always the preferred method for hazardous waste disposal.**

**Reason: Incineration is costly and contributes to air pollution. Correct**

**Answer: D) Assertion is false, but Reason is true**

**Explanation:** Incineration is not always preferred due to its cost and air pollution (reason true). Other methods like bioremediation may be better (assertion false).

**Matrix Matching Type:**

**15) Match the following:**

| S.No | Column I | Column II |
|---|---|---|
| 1. | Technique reduces water runoff, allowing water to percolate into the soil and preventing erosion along slopes | q. Contour Ploughing |
| 2. | An approach that utilizes plants to assist in the bioremediation process | p. Phytoremediation |
| 3. | Excessive salt accumulation in soil reduces crop productivity | r. Agricultural waste |
| 4. | Disrupt soil fauna and flora | s. Soil erosion |

**Explanation:**

Contour ploughing reduces runoff and erosion.

Phytoremediation uses plants for bioremediation.

Agricultural waste (e.g., fertilizers) causes salinization.

Soil erosion disrupts soil fauna and flora.

**Comprehension Type:**

**16) What is mentioned as a common outcome of natural disasters? Correct**

**Answer: C) Significant destruction and land pollution**

**Explanation:** Natural disasters cause destruction and leave debris, contributing to land pollution.

**17) What can natural disasters such as earthquakes, landslides, hurricanes, and floods cause? Correct**

**Answer: B) Land pollution**

**Explanation:** These disasters generate debris and contaminants, leading to land pollution.