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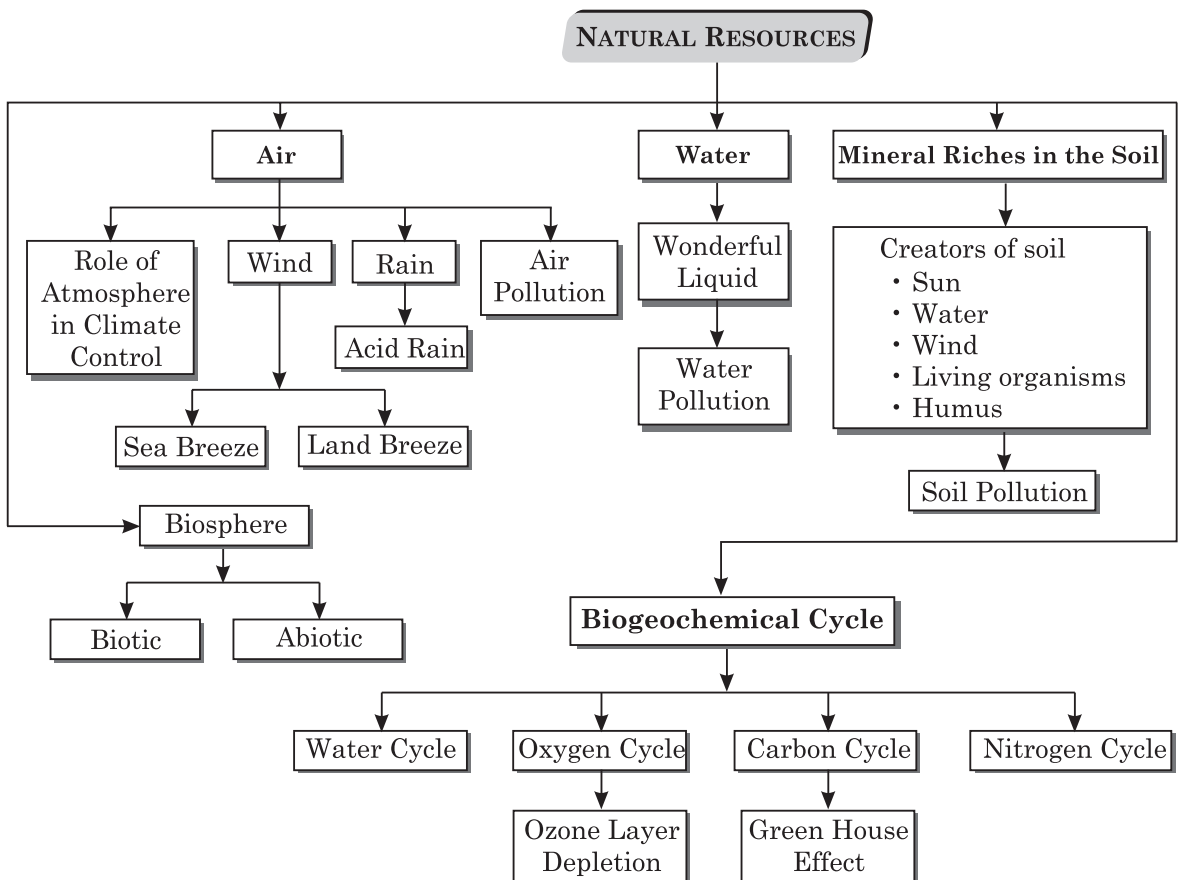
Natural Resources

TOPICS COVERED

14.1 The Breath of Life: Air
14.2 Water: A wonder liquid

14.3 Mineral Riches in the Soil
14.4 Biogeochemical Cycles

CHAPTER MAP



QUICK REVISION NOTES

- *Earth* is the only planet where life exists because of suitable temperature, air, water, sunlight and food.
 - The resources available on the earth are called natural resources which are essential for life on the earth.
 - The outer crust of the earth is Lithosphere.
 - Water covers 75% of the earth, it is called Hydrosphere.
 - The air which covers the earth is called Atmosphere.
 - *Biosphere* is a life supporting zone of the earth where lithosphere, hydrosphere and atmosphere interact with each other and make the life of all the living organism possible.
 - Living components of biosphere are called biotic component whereas air, water, soil are non living abiotic components of the atmosphere.
 - Uneven heating of air over land and water bodies causes wind.
 - *Atmosphere* controls climate on the earth and makes it suitable for the living organism.
 - Water of oceans, lakes, rivers get evaporated to form clouds which bring rain. Rain brings change in climate and is essential for the life of plants and animals.
 - Satellite predicts the changes in climate like rain, snowfall, storm etc in advance so that people remain alert and safe.
 - *Air pollution* is a major problem in metro cities due to increase in vehicles, construction of buildings, deforestation. It leads to stress, lungs, respiratory and heart ailments.
 - *Water* is a wonderful liquid which is essential for our life. Living beings cannot survive without water.
 - *Water pollution* leads to water borne diseases and makes it unfit for drinking. Government is trying to clean rivers like Ganga, Yamuna to facilitate drinking water to all people.
 - *Mineral riches of soil* is the most important natural resource. Coal and petroleum are essential for our life. Metals like gold, silver, iron, copper, aluminium are found in the earth crust. Diamonds are also found in mines.
 - Good soil is needed for agriculture, pottery, etc.
 - *Biogeochemical cycle* involves constant interaction between biotic and abiotic components of the atmosphere for transfer of matter. It makes it dynamic and a stable system. There is transfer of nutrients between these components.
 - *Water cycle*, involves evaporation of water from plants and water bodies, their condensation to form clouds and water comes back in form of rain.
 - *Nitrogen cycle* involves using of nitrogen from the atmosphere and returning back to atmosphere. Nitrogen is an essential component of proteins, nucleic acid, DNA, RNA and some vitamins.
 - *Carbon cycle* involves recycling of carbon from carbon dioxide in the atmosphere to various living and non living components of ecosystem. CO₂ is essential for photosynthesis. It is a green house gas which increases temperature of the earth causing Global warming.
 - Sun light is trapped in glass and gases like CO₂, water vapours, methane absorb infra-red radiations of sun light and increase the temperature of the earth, it is called Green house effect. Due to greenhouse effect, earth's temperature gradually increases. It is called global warming.
 - *Oxygen cycle* is essential for our life. Human beings and animals take oxygen from the atmosphere and release CO₂. Plants take up CO₂ for photosynthesis and release oxygen. This cycle is continuous and sustains life of all living organisms.
 - Ozone layer is formed in the upper atmosphere by the action of ultra violet (UV) light on oxygen. Ozone absorbs UV radiations and protects us from its harmful effects.
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- CFC (Chloro fluoro carbon) is used as refrigerant which leads to depletion of ozone layer which must be stopped in order to protect people on the earth.

1. THE BREATHE OF LIFE: AIR

Natural Resources

The stocks of nature like air, water, soil, and energy from the Sun which are useful to mankind are called natural resources.

Air: It contains 78% of nitrogen, 21% of oxygen along with 0.03% carbon dioxide, argon (~1%) and water vapours. It is essential for our life.

Role of Atmosphere: Air is a bad conductor of heat. It maintains temperature of the earth, suitable for all living organisms to sustain life.

- It prevents sudden increase in temperature during day time as well as night.
- Life does not exist on other planets due to absence of the atmosphere.

Winds: During the day, wind moves from the sea to the land because air above the land gets heated and starts rising and cold air from the sea takes its place, it is called **sea breeze**.

At night, warm air from the sea rises and cool air from the land moves faster to take its place, it is called **land breeze**. Earth cools faster than sea water at night.

This movement of air from one place to another is called *wind*. It controls the climate of the earth.

Rain: It is formed by the evaporation and condensation of water through water cycle.

Rain is essential for the life. Agriculture and water level in water bodies depends upon rain. We can also increase the level of underground water by **rain water harvesting**. Other it happen in nature due to percolation.

Air pollution: The release of carbon dioxide, oxides of sulphur, nitrogen, carbon monoxide, vapours of hydrocarbons, lead, arsenic, nickel, fluoride, dust particle all cause air pollution.

- It can cause respiratory, skin disorders, hypertension (high blood pressure), stress, eye irritation, heart ailments and cancer.
- It reduces growth of plants by degeneration of chlorophyll, patches/spots of colour on leaves.

Acid rain: Acidic oxides of sulphur (SO_2 , SO_3) and nitrogen (NO_2) cause acid rain which form sulphurous acid, sulphuric acid, and nitric acid with rain water.

- It is harmful for agriculture, plants and buildings made up of marble and metals.

Exercise 14.1

I. Very Short Answer Type Questions

(1 Mark)

1. Name the main component of the suspended particles in air? [CBSE 2014]
 2. Give the full form of CFCs. [DOE]
 3. Write the formula of ozone. [DOE]
 4. Which acids are present in acid rain?
 5. Explain the role of atmosphere in climate control. [CBSE 2012]
 6. What is the importance of presence of green house gases in the atmosphere? [CBSE 2012]
 7. Write the two biotic components of the biosphere. [CBSE 2011]
 8. What are the available resources on the earth for life to exist? [CBSE 2012]
 9. Give the names of two air pollutants. [CBSE 2010]
 10. Which is heated faster: land or sea water?
 11. Which gets cool faster: land or water?
 12. What causes wind? [NCERT]
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13. What acts as a nucleus for the condensation of water?
14. Do dust particles increase/decrease temperature of the earth?
15. Name any two gases which are produced by the combustion of fossil fuels?
16. If there were no atmosphere around earth. What will happen to the temperature of day and night?
17. Name the atmospheric gas that leads to global warming. [CBSE 2012]
18. When we breathe in air, nitrogen also goes inside along with oxygen. What is the fate of this nitrogen?
19. In a city like Delhi, during cold weather why is visibility so low especially in morning?
20. Why do people love to fly kites near the sea shore?
21. Why does Mathura refinery pose problems to the Taj Mahal?
22. Why do not lichens occur in Delhi where as they commonly grow in Manali or Darjeeling?
23. Carbon di oxide is necessary for plants. Why do we consider it as a pollutant?
24. The temperature on moon ranges from -190°C to 110°C while on earth, it is around 20°C – 30°C . Why?

II. Short Answer Type Questions–I

(2 Marks)

25. List three activities which lead to environmental pollution or air pollution. [CBSE 2012]
26. How does the atmosphere act as a blanket on the earth?
27. How are clouds formed? [NCERT]
28. Why is atmosphere essential for our life? [NCERT]
29. What are natural resources present on the earth? [DOE]
30. A motor car, with its glass totally closed, is parked directly under the sun. The inside temperature of the car rises very high. Explain why?
31. Explain how CO_2 being produced? Explain how inspite of so much of its production, it makes only 0.03% of total gases?

III. Short Answer Type Questions–II

(3 Marks)

32. How is the atmosphere of Venus/Mars different from that of Earth? Name two main gases present in the Earth's atmosphere. [NCERT] [CBSE 2014]
33. How is the quality of air affected due to the combustion of fossil fuels and how does this change in quality affect us and other life forms?

Answers 14.1

1. Dust particles are the main component of suspended particles in air.
 2. CFC stands for Chloro Fluoro Carbon.
 3. O_3 is the formula for ozone.
 4. Sulphurous acid, Sulphuric acid and Nitric acid are present in acid rain.
 5. Atmosphere maintains temperature of the earth suitable for all living organisms during day time and whole life.
It prevents sudden increase in temperature during day time as well as night.
Life does not exist on other planets due to absence of the atmosphere.
 6. They maintain the temperature of earth during day and night by absorbing infra-red radiations of the Sun.
 7. Plants and animals are the two biotic components of the biosphere.
 8. Water, air, land and sun light help in life existence on earth.
 9. Sulphur dioxide and nitrogen dioxide are two air pollutants.
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10. Land gets heated faster than sea water.
 11. Land gets cool faster than water.
 12. Uneven heating of air over land and water bodies causes wind.
 13. Dust particles act as a nucleus for condensation of water.
 14. Dust particles decrease the temperature of the earth.
 15. Carbon dioxide and sulphur dioxide are produced by combustion of fossil fuels.
 16. The temperature of the day will increase and at night it will decrease due to absence of atmosphere.
 17. Carbon dioxide leads to global warming.
 18. Nitrogen comes out with the CO during exhalation.
 19. Due to unburnt carbon particles or hydrocarbons suspended in cold moist air make smog-smoke and fog.
 20. Wind created during the day time near sea shore help the kite to fly.
 21. Mathura refinery releases toxic gases (like oxides of sulphur) which causes acid rain and hence causing corrosion of the marbles of Taj Mahal.
 22. Lichen is a bio-indicator and sensitive to SO pollution from automobiles. Delhi has maximum number of automobiles, hence has a highly polluted environment.
 23. Increasing concentration (more than normal) of CO₂ is harmful and considered as a pollutant. Higher concentrations of CO₂ is one of the causes of green house effect/global warming.
 24. On the surface of the moon, there is no atmosphere, while on earth the atmosphere prevents the sudden increase in temperature during the day light hours. And during the night, it slows down the escape of heat into outer space.
 25. Three activities leading to environmental/air pollution are:
 - (i) Burning of fossil fuel.
 - (ii) Excessive use of fertiliser, pesticides, insecticides.
 - (iii) Deforestation/forest fires.
 26. Air is a bad conductor of heat. It traps sunlight during day time and keeps the temperature of the earth moderate during day time. It does not allow the heat trapped during day time to go out of atmosphere at faster rate during night, therefore, keeps night also at moderate temperature.
 27.
 - (i) When water bodies are heated during day time, a large amount of water evaporates and goes into air.
 - (ii) The hot air rises up carrying water vapours with it.
 - (iii) As air rises, it expands and cools.
 - (iv) This cooling causes the water vapour in the air to condense in the form of tiny droplets and form clouds.
 28.
 - (i) Atmosphere contains oxygen essential for our life.
 - (ii) It also maintains the temperature of the earth to almost constant.
 29. Air, water, soil are abiotic resources of earth. Plants and animals are biotic resources on the earth.
 30. Infra-red radiations in sunlight pass through the glass and heat the interior of the car. The radiation emitted by up holstery and other inner parts of the car cannot pass out of the glass, so the heat trapped inside raises the temperature of the interior. This is because glass is transparent to infra- red radiation from the sun having smaller wavelength than that emitted by the interior of the car which are of longer wave length to which the glass is opaque.
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31. Eukaryotic cells and many prokaryotic cells, need oxygen to break down glucose molecules and get energy for their activities. This results in the production of carbon dioxide. It is called respiration.

Another process which results in the consumption of oxygen and the continuous production of carbon dioxide is combustion. This includes not just human activities, which burn fuels to get energy, but also forest fires. Despite this, the percentage of carbon dioxide in our atmosphere is a mere fraction of a percent because carbon dioxide is 'fixed' in two ways:

- (i) Green plants convert carbon dioxide into glucose in the presence of Sunlight and
- (ii) Many marine animals use carbonates dissolved in sea-water to make their shells.

32. **Venus** has thick atmosphere trapped with a dense layer of cloud about 20 km thick, consisting largely of concentrated sulphuric acid.

Mars has barren, rocky world with a thin atmosphere (less than 1% of the pressure at the earth's surface), 95% carbon dioxide and 5% made up of nitrogen, argon, oxygen and water vapours. The surface is covered with reddish iron rich clay like soil and light dust. Life is not possible on Venus and Mars due to lack of oxygen. Earth has mainly two gases nitrogen and oxygen in its atmosphere.

33. The fossil fuels like coal and petroleum contain small amounts of nitrogen and sulphur. When these fuels are burnt, nitrogen and sulphur too are burnt and this produces different oxides of nitrogen and sulphur. Not only is the inhalation of these gases dangerous, they also dissolve in rain to give rise to acid rain. The combustion of fossil fuels also increases the amount of suspended particles in air. These suspended particles could be unburnt carbon particles or substances called hydrocarbons. Presence of high levels of all these pollutants cause visibility to be lowered, especially in cold weather when water also condenses out of air. This is known as smog and is a visible indication of air pollution. Studies have shown that regularly breathing air that contains any of these substances increases the incidence of allergies, cancer and heart diseases. An increase in the content of these harmful substances in air is called air pollution.

2. WATER: A WONDER LIQUID

- Most of the water exist in the form of sea and oceans which have salty water.
- Fresh water is found in frozen form in ice caps at the two poles and on snow capped mountains.
- The underground water and water from the lakes, rivers, ponds, springs is fresh water.
- In villages, people bring water from far off places.
- All living organisms need water to survive because it is needed for all cellular activities.
- Substances get dissolved in water and then transported to various parts of the body of living organism.
- Availability of water in a particular area decide the number and type of plants and animals in that area i.e. flora and fauna.
- Water also decides the bio-diversity of life in the area along with nature of soil and temperature.
- Water is a major resource which determine life on earth.

Water Pollution

- The contamination of undesirable substances in water leads to water pollution.
 - The sewage from towns, cities, industrial wastes are dumped into water bodies.
 - Some industries use water for cooling and release hot water into water bodies.
 - Water is released from dam from time to time when it is hotter.
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- Life of aquatic species get affected. Dissolved oxygen is less in warm and polluted water which is needed for their survival.
- The fertilizers, pesticides, insecticides, mercury salts used by paper and leather industry cause water pollution which leads to growth of micro-organism causing water borne diseases.
- Detergents which are not biodegradable causes water pollution.

Exercise 14.2

I. Very Short Answer Type Questions

(1 Mark)

1. What is the most unique feature of water?
2. Which component of air has highest solubility in water?
3. Why are aquatic species more comfortable in cold water than hot water?
4. Name a pollution free source of energy.
5. Why is water rarely available in pure form?
6. Mention two processes which replenish water back in the environment.
7. In how many forms is water available?
8. Why does water need conservation even though large oceans surround the land masses?
9. There is mass mortality of fishes in a pond. What may be the reasons?

II. Short Answer Type Questions–I

(2 Marks)

10. Why do organisms need water? [NCERT]
11. What is the major source of fresh water in the city/town/village where you live? [NCERT]
12. Do you do any activity which may be polluting this water source? [NCERT]
13. Give renewable sources of energy.
14. Name two ways of preventing water pollution.
15. How are rainfall patterns decided?
16. Rivers from land, add minerals to sea water. Discuss how? [NCERT Exemplar]
17. How is the life of organisms living in water affected when water gets polluted?
18. 'Water every where, But no water to drink', what do you understand by this statement?
19. How clouds are formed and bring us rain?
20. Elaborate what effects on the water body would amount to its pollution?

III. Short Answer Type Questions–II

(3 Marks)

21. In coastal area, wind current moves from the sea towards the land during day; but during night it moves from land to the sea. Discuss the reason. [CBSE 2016]
22. Is there any relationship between the amount of available water and the number and variety of plants and animals that can live in a given area? Are there some other factor which may play an important role too?

Answers 14.2

1. (i) Most of the compounds in our cell are soluble in water so it is a good medium for metabolic activities in cell.
(ii) Water can dissolve large number of substance which makes it a wonder liquid (universal solvent).
 2. Carbon dioxide has highest solubility in water.
 3. Cold water has more dissolved oxygen than hot water therefore aquatic species feel more comfortable in cold water.
 4. Solar energy, Hydrogen.
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5. Water is rarely available in pure form because it can dissolve large number of substances which make it impure.
 6. Respiration and Transpiration replenish water back in the environment.
 7. Water is available in the form of liquid and solid in the form of surface and underground water. Ice is formed at mountains.
It also exist as water vapours (gaseous) form in atmosphere.
 8. Marine water is not useful for human and plant life directly. Uneven distribution of limited fresh water resources need conservation to cater to the demands.
 9. (i) Thermal pollution
(ii) Addition of poisonous (mercury) compounds in water
(iii) Due to block age of gills with any pollutant. (Any one)
 10. (i) Organisms need water for all cellular activities.
(ii) Transportation of nutrients takes place with the help of water.
(iii) Plants require water for photosynthesis.
(vi) Our body contains 70% of water which maintains body temperature. (Any two)
 11. In city, mostly river is a major source of fresh water. In town, lake or river is a major source of fresh water. In villages, ponds and wells are sources of fresh water. Handpumps and tube wells are used for underground water. Sea water is source of water in Gulf countries.
 12. (i) Dumping of waste materials.
(ii) Washing of clothes.
(iii) Dumping of industrial waste.
(iv) Immersion of remains of dead body in holy river like Ganga. (Any two)
 13. Solar energy, Wind energy, Hydel energy, Tidal energy, Geothermal energy, Ocean thermal energy. (Any four)
 14. Two ways of preventing water pollution are:
(i) No dumping of waste materials.
(ii) Treatment of industrial and sewage water before releasing into water bodies.
(iii) Use of green and eco-friendly pesticides, insecticides and biofertilizers instead of harmful non-biodegradable chemicals. (Any two)
 15. Rainfall patterns are decided by wind patterns. In most parts of India, rains are brought by the south-west or north-east monsoons. Depressions in the Bay of Bengal also cause rain in some areas.
 16. River passes through land and rocks which contain minerals. The minerals get dissolved in water are carried by the river to sea water.
 17. When water gets polluted, oxygen dissolved in water gets used up in decomposition of organic waste materials. The amount of dissolved oxygen decreases which makes life of organisms living in water difficult.
 18. 75% of our earth contains water mainly in form of oceans which has lot of dissolved salts which cannot be used for drinking. River and lake water also contain dissolved salts therefore cannot be used for drinking directly without purification. Fresh water, fit for drinking is very less.
 19. When water bodies are heated during the day, a large amount of water evaporates and goes into the air. Some amount of water vapour also get into the atmosphere because of various biological activities. This air also gets heated. The hot air rises up carrying the water vapour with it. As the air rises, it expands and cools. This cooling causes the water vapour in the air to condense in the form of tiny droplets. This condensation of water
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is facilitated if some particles could act as the 'nucleus' for these drops to form around. Normally dust and other suspended particles in the air perform this function. Once the water droplets are formed, they grow bigger by the 'condensation' of these water droplets. When the drops have grown big and heavy, they fall down in the form of rain.

20. Water-pollution covers the following effects:

- (i) The addition of undesirable substances to water-bodies. These substances could be the fertilisers and pesticides used in farming or they could be poisonous substances, like mercury salts which are used by paper-industries. These could also be disease-causing organisms, like the bacteria which cause cholera.
- (ii) The removal of desirable substances from water-bodies. Dissolved oxygen is used by the animals and plants that live in water. Any change that reduces the amount of this dissolved oxygen would adversely affect these aquatic organisms. Other nutrients could also be depleted from the water bodies.
- (iii) A change in temperature. Aquatic organisms can only withstand to a certain range of temperature in the water-body where they live, and a sudden marked change in this temperature would be dangerous for them or affect their breeding. The eggs and larvae of various animals are particularly susceptible to temperature changes.

21. During day, air over the land gets heated up faster and starts rising and creates an area of low pressure. As a result cold river over sea rushes to this area of low pressure, so wind moves from sea to land. At night, air of land cools down faster and air over sea remains hot, which creates low pressure at sea and air of land moves to sea.

22. The availability of water decides not only the number of individuals of each species that are able to survive in a particular area, but it also decides the diversity of life there. Of course, the availability of water is not the only factor that decides the sustainability of life in a region. Other factors like the temperature and nature of soil also matter. But water is one of the major resources which determine life on land.

3. MINERAL RICHES IN THE SOIL

Soil

- It is the portion of each surface consisting of disintegrated rocks and decaying organic material.
- It is the most important resource that decides bio diversity of an area.

Crust: The outermost layer of our earth is called **crust**. The minerals present in this layer are needed by all living organism.

Creators of Soil

Sun:

- Sun heats up rocks during day time which expand them.
- At night, these rocks cool down and contract.
- All parts of rocks do not expand and contract at the same ratio, this results in formation of cracks and huge rocks break into smaller pieces.

Water:

- Water gets into the cracks formed in the rocks due to uneven heating of sun.
 - This water freezes, cracks formed widen up because ice has more volume than liquid water.
 - Flowing water wears away hard rock over a long period of time into smaller particles.
 - Water takes small particles along with it and deposits down its path as silt from which soil is formed.
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Wind:

- Strong wind also erode rocks down.
- Wind carries sand from one place to another.

Living organism:

- Lichen grows on the surface of rocks.
- They release certain substances that cause rocks to powder down and form thin layer of soil.
- Moss are able to grow on the surface of rocks to break up further. Animal make burrows and erode them too.
- The roots of big trees go into cracks and makes the cracks bigger.

Humus:

- It is bits of decayed living organisms which increases the fertility of the soil.
- Soil also contains various forms of micro organisms like nitrifying bacteria which help to increase the fertility of soil.
- The type of soil is decided by the average size of particles.
- The quality of soil depends upon amount of humus and micro-organisms.
- Humus makes the soil more porous and allows water and air to penetrate underground deeply.
- The mineral content in soil depends upon the rocks from which it is formed.
- The nutrient content, amount of humus and depth of soil decide which type of plants will grow on that soil.
- **Topsoil:** The top layer of soil that contain humus, living organism in addition to soil particles is called top soil. It decides fertility and bio-diversity.

Soil Pollution

- Fertilizers, pesticides and insecticides which are used in modern agricultural practices for a over a long period of time kill micro-organism in soil which recycle nutrients to soil.
- It kills earthworms which form humus to rich soil.
- Those substance which destroy nutrients of the soil and add other substances which affect the fertility of soil are **soil pollutants**.
- **Soil erosion** by water in absence of plants and big trees which bind soil and also decrease the fertility of the soil.
- If top soil is washed away and the rocks are exposed then nothing can grow on rocks.
- The roots of plants prevent soil erosion.
- Vegetative cover on the ground helps in percolation of water into deeper layers and prevent soil erosion.

Exercise 14.3

I. Very Short Answer Type Questions

(1 Mark)

1. What happens when rain falls on soil without vegetation cover?
 2. How can soil erosion be prevented?
 3. Growth of lichens on barren rocks is followed by the growth of which organism?
 4. What is a major source of minerals in soil?
 5. What does top soil contain?
 6. What is the effect of the use of large amount of fertilizers and pesticides on quality of soil?
 7. What is smog?
 8. State two factors responsible for weathering of rocks. [CBSE 2012]
 9. Name three types of soil.
 10. Fertile soil has lots of humus. Why?
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11. Why step farming is common in hills?

II. Short Answer Type Questions–I

(2 Marks)

12. Name four factors which play important role in formation of soil? [NCERT Exemplar]
13. How do lichen and mosses help in formation of soil? [NCERT Exemplar]
14. What is soil erosion?
15. What is humus? What is its function in the soil?
16. Give four ways to prevent soil erosion.
17. What is soil comprised of ?
18. Explain the statement, 'the factors that created the soil in the first place and brought the soil to that place may be responsible for the removal of the soil too'.

III. Short Answer Type Question–II

(3 Marks)

19. What is top soil? What is its role in farming? How is it being affected due to modern practices?

Answers 14.3

1. Rain water causes loss of surface soil, soil erosion.
 2. Soil erosion can be prevented by raising forests.
 3. Moss growth follows growth of lichens.
 4. The parent rock from which soil is formed is the major source of minerals.
 5. Humus, living organisms and soil particles are present in top soil.
 6. Use of large amount of fertilizers turn the field barren after some time.
 7. Smog is a mixture of smoke and fog.
 8. (i) Uneven heating and cooling during day and night.
(ii) Flowing water breaks rocks into small pieces and take them along.
 9. (i) Sandy soil
(ii) Clayey soil
(iii) Loamy soil.
 10. Fertiles soils are rich in organisms that decomposes dead organic matter forming humus. Humus gives minerals, absorbs water and makes soil porous.
 11. Step farming is practiced to check soil erosion through water currents on the slopes of hills.
 12. Sun, wind, water are abiotic whereas living organism are biotic factors which play an important role in formation of soil.
 13. Lichen and moss grow on rocks. They release substances (chemicals) which breakdown the stones into fine particles resulting in the formation of soil. The mode of action is chemical.
 14. Soil erosion is the removal of top soil by water or wind which contains essential nutrients for the growth of plants.
 15. Humus is the remains of plants and animals in the soil. Humus is rich in plant nutrients and increases fertility of the soil.
 16. (i) Constructing strong embankments along the river banks as well as fields.
(ii) Growing more plants.
(iii) Proper drainage canals around fields.
(iv) Terrace farming on hill station can prevent soil erosion.
 17. Soil is a mixture. It contains small particles of rock (of different sizes). It also contains bits of decayed living organisms which is called humus. In addition, soil also contains various forms of microscopic life.
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18. The soil that we see today in one place has been created over a very long period of time. However, some of the factors that created the soil in the first place and brought the soil to that place may be responsible for the removal of the soil too. The fine particles of soil may be carried away by flowing water or wind. If all the soil gets washed away and the rocks underneath are exposed, we have lost a valuable resource because very little will grow on the rock.

19. The nutrient content of a soil, the amount of humus present in it and the depth of the soil are some of the factors that decide which plants will thrive on that soil. Thus, the topmost layer of the soil that contains humus and living organisms in addition to the soil particles is called the topsoil. The quality of the topsoil is an important factor that decides biodiversity in that area.

Modern farming practices involve the use of large amounts of fertilizers and pesticides. Use of these substances over long periods of time can destroy the soil structure by killing the soil micro-organisms that recycle nutrients in the soil. It also kills the earthworms which are instrumental in making the rich humus. Fertile soil can quickly be turned barren if sustainable practices are not followed.

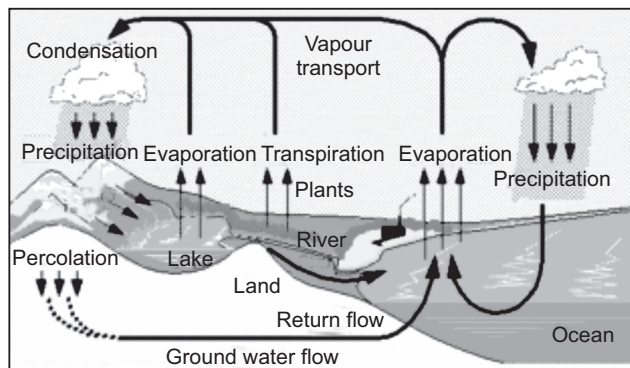
Removal of useful components from the soil and addition of other substances, which adversely affect the fertility of the soil and kill the diversity of organisms that live in it, is called soil pollution.

4. BIOGEOCHEMICAL CYCLES

- The cycling of chemical elements like carbon, nitrogen, oxygen, phosphorus, sulphur and water in the biosphere is called **Biogeochemical cycles**.
- This cycle operates through abiotic factors like soil, water, air and biotic factors of living organisms.

Water cycle

The process in which water evaporates and falls on the land as rain by condensation and later flows into the sea through rivers is called water cycle.



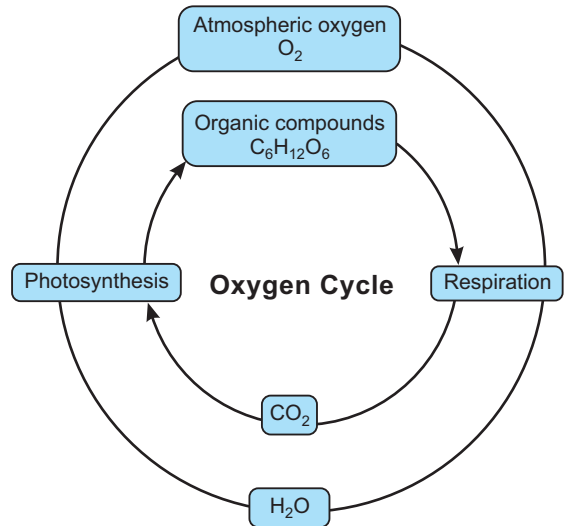
Water cycle

- When sun shines, water evaporates continuously from water bodies and form water vapours.
- The water vapour rises up and goes into the atmosphere.
- The plants absorb water for photosynthesis.
- Plants lose water through transpiration which goes into the atmosphere.
- Respiration in animals and human being forms water which enters the atmosphere.
- The condensation of water vapours takes place leading to rain. It also forms dew. It forms snow at mountains.

- Some of the water seeps into the soil and becomes part of the underground water.
- Underground water is used by the plants, people in the villages and this cycle goes on.
- Water, which reaches sea dissolves many salts in it, therefore, sea water is salty.

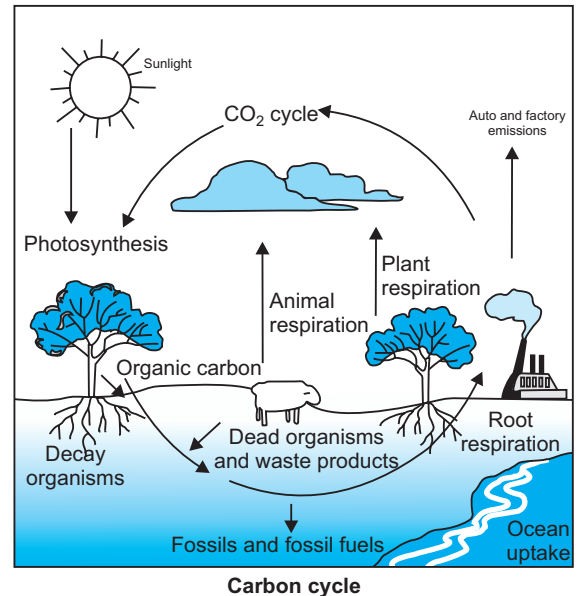
Oxygen cycle

- Air contains 21% of oxygen.
- The cycle by which oxygen is circulated continuously in the atmosphere by living and non-living organisms is called *Oxygen cycle*.
- Human beings and animals take oxygen from the atmosphere and release CO_2 and H_2O during respiration.
- The dead organisms also need oxygen for their decomposition.
- The burning of fossil fuels need oxygen.
- Plants take up CO_2 and H_2O for photosynthesis and release oxygen in the atmosphere.
- This oxygen is used by the human beings and animals.
- This oxygen cycle continues in nature to keep the level of oxygen almost constant.
- We must grow plants so as to keep the atmosphere rich in oxygen.



Carbon cycle

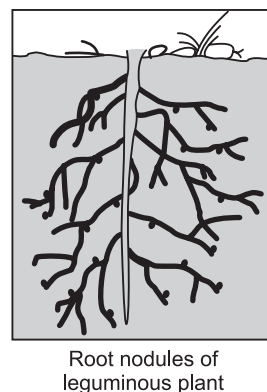
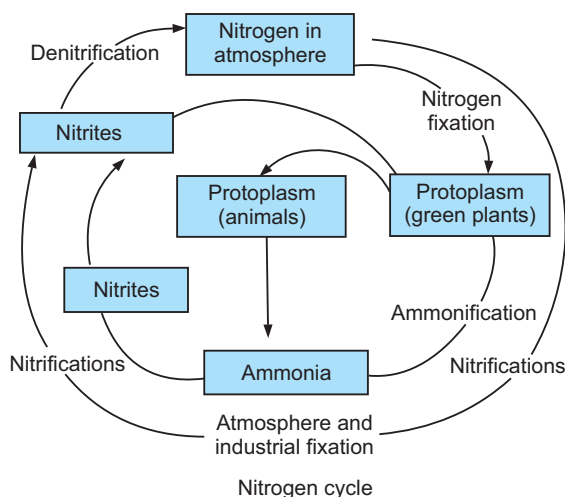
- The balancing of element carbon in the atmosphere is called *Carbon cycle*. Earth contains 0.03% CO_2 in the atmosphere.
- Carbon is present in the form of carbonates and bicarbonates in water. It is also present in all living organisms. It is also present as carbohydrates, proteins, fats and nucleic acids.
- Plants use carbon dioxide in photosynthesis and give out oxygen.
- Plants and animals break carbohydrates into CO_2 and H_2O which is returned to the atmosphere.
- When plants and animals die, micro-organisms like fungi and bacteria decompose the dead remains of plants and animals and release carbon in the form of carbon dioxide.
- Some remains of plants get converted into coal, petroleum and natural gas deep inside the earth. This process takes million of years.
- On burning fossil fuels CO_2 is released into the atmosphere.



Nitrogen cycle

- The process in which the nitrogen of the atmosphere reaches the soil and finally back to the atmosphere is called *nitrogen cycle*.

- 78% Nitrogen is present in the atmosphere.
- Proteins contain nitrogen. It is also present in RNA, DNA, Vitamins, chlorophyll.
- Nitrogen is taken up by the leguminous plants (pulses) directly from the atmosphere and by nitrogen fixing bacteria **Rhizobium** present in the root nodules of leguminous plants which converts nitrogen into ammonia. It fixes nitrogen up to 90%.
- Lightening converts N_2 into oxides of nitrogen by combining with oxygen at high temperature and pressure.
- Oxides of nitrogen change into nitrates and nitrites with help of water and soil.
- Nitrates and Nitrites are soluble in water and are readily used by aquatic plants and animals.
- Nitrates and nitrites get converted into nitrogen by denitrification bacteria.



Ammonification: It is the conversion of dead organic matter into ammonia with the help of microorganisms present in the soil.

Nitrification: It is a process in which ammonia is converted into nitrogen.

Denitrification: It is a process in which nitrites and nitrates are converted into nitrogen which is released in the atmosphere.

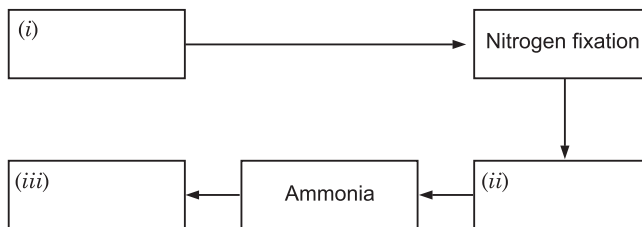
Green House effect: It is a process in which heat of the sun is trapped by glass, CO_2 , CH_4 , water vapours, nitrous oxide thereby increasing the temperature of the earth.

Green House gases: These gases prevent the escape of the heat from the atmosphere which increase the temperature of the earth leading to global warming and climate change. The increase in CO_2 level in atmosphere also leads to global warming.

Ozone layer

- In upper atmosphere, oxygen is converted into ozone (O_3) with the help of U.V. radiations.
- Ozone is poisonous and a strong oxidising agent.
- Ozone protects us from ultra violet radiations of the Sun. These radiations may cause skin cancer if reaches the earth.
- Ozone depletion is caused by use of CFC (Chloro fluoro Carbons) in air conditioners and refrigerators. It persists in the atmosphere for a long time. CFC is also used in the spray cans of fire extinguishers.

20. Complete the flow chart to show the important stages of nitrogen cycle.



21. What is the greenhouse effect? How is it produced due to burning of fossil fuels? If not checked what environmental phenomenon is it leading to?

IV. Long Answer Type Questions

(5 Marks)

22. Explain oxygen cycle.

[DOE]

23. Explain the role of sun in the formation of soil. Justify. "Dust is a pollutant". [CBSE 2014]

24. The above diagram shows a simplified biogeochemical cycle

- Name the compound whose cycle is depicted.
- In what way do vehicles add this compound to the atmosphere?
- What adverse effect does its excess have on the environment?
- Cite an event which depicts this effect in the modern times.
- Suggest two ways of reducing this effect.

Answers 14.4

- Skin cancer, irritation in eyes and weaken immune system is caused by UV radiation.
(Any one)
- Rhizobium is the nitrogen fixing bacteria.
- Leguminous plants absorb nitrogen directly from atmosphere.
- Proteins and Nucleic acid (RNA & DNA) contain both nitrogen and oxygen.
- CO₂ (Carbon dioxide) leads to global warming.
- The green house gases maintain the temperature of the earth by absorbing I.R. (Infra red) radiations of sun during the day and as well as at night.
- Plants take up CO₂ during photosynthesis to form carbohydrates. CO₂ is returned to atmosphere by respiration in which carbohydrates produce CO₂ and H₂O in the presence of oxygen. CO₂ is also produced by the combustion of fossil fuels.
- U.V. radiations.
- Oxygen cycle releases CO₂ and H₂O by consuming oxygen. Aerobic respiration also needs oxygen.
- Oxygen (O₂) and ozone (O₃) are two other forms of oxygen.
- Cholera, amoebic dysentery, Jaundice, Typhoid are water borne diseases.
- Green house gases absorb infra-red radiations from sun light. It increases temperature of the earth which leads to Global warming. It will melt ice on poles and may cause floods and rise in the level of sea water.

13.	Oxygen	Ozone
	It is colourless, odourless gas.	It is slightly blue in colour.
	It is diatomic	It is triatomic.
	It is less reactive than ozone.	It is more reactive than O ₂ .
	It is not poisonous	It is poisonous.
	It does not protect us from U.V. radiation	It protect us from U.V. radiations. (Any four)

20. (i) Atmospheric nitrogen
(ii) Ammonification.
(iii) Denitrification.
21. Heat is trapped by glass, and hence the temperature inside a glass enclosure will be much higher than the surroundings. This phenomenon was used to create an enclosure where tropical plants could be kept warm during the winters in colder climates. Such enclosures are called greenhouses.
Greenhouses have also lent their name to an atmospheric phenomenon. Some gases prevent the escape of heat from the Earth. An increase in the percentage of such gases in the atmosphere would cause the average temperatures to increase worldwide and this is called the greenhouse effect. Carbon dioxide is one of the greenhouse gases. An increase in the carbon dioxide content in the atmosphere would cause more heat to be retained by the atmosphere and lead to global warming.
22. The cycle by which oxygen is circulated continuously in the atmosphere by living and non-living organisms is called **Oxygen cycle**.
- Human beings and animals take oxygen from the atmosphere and release CO_2 and H_2O during respiration.
 - The dead organisms also need oxygen for their decomposition.
 - The burning of fossil fuels need oxygen.
 - Plants take up CO_2 and H_2O for photosynthesis and release oxygen in the atmosphere.
 - This oxygen is used by the human beings and animals.
 - This oxygen cycle continues in nature to keep the level of oxygen almost constant.
 - We must grow plants so as to keep the atmosphere rich in oxygen.
23. **Role of Sun in the formation of soil:** Sun heats up rocks during the day time by which they expand.
(i) During night, rocks cool down and contract.
(ii) Since all the parts of rocks do not expand and contract at the same rate, this results in formation of cracks and ultimately the huge rock breaks up into smaller pieces.
- Dust as a pollutant:**
- Dust suspends in air which can cause allergy and respiratory problems.
 - It covers stomata of plants and affects exchange of gases and retards plant growth.
 - It can cause irritation in eyes.
 - It can act as a carrier of vapours of lead and other heavier metals which are toxic.
24. (a) Carbon
(b) Burning of petrol and diesel
(c) Greenhouse effect
(d) Global warming
(e) Carpools, taking public transport, walking or cycling to work. (Any two)

VALUE BASED QUESTIONS

1. (a) Why linking of rivers is a need of present scenario? How it can be achieved?
(b) What values are associated with Late Dr. A.P.J. Abdul Kalam who gave this suggestion to solve water crisis?
2. Some people have started NGO, who send plumbers to various homes and places where there is wastage of water due to leakage. They also suggest ways to people to conserve water.
(a) What values are associated with these people?
(b) How can we conserve water?
-

Answers

1. (a) Linking of rivers is need because in some states there is flood every year whereas in other states there is drought. Therefore, linking of river will solve both the problems simultaneously.
It can be done by making canals between rivers which can connect the big rivers so that maximum number of people get benefit out of it. We can save people from floods and drought.
- (b) Dr. A.P.J. Abdul Kalam was concerned about the welfare of all people of India.
2. (a) These people are saving the most precious resource i.e. water which is essential for our life.
- (b) (i) Integrated water shed plan for drinking and industrial use.
(ii) Rain water harvesting.
(iii) Flood Control Methods
(iv) Linking of Rivers.
(v) Avoiding wastage and misuse of water.

COMMON ERRORS

Errors	Corrections
• Students do not draw diagrams of biogeochemical cycles.	☞ Do practice of making diagrams in pencil.
• Students do not label diagrams.	☞ All the parts of diagram must be labelled neatly in pencil.
• Students do not know full form of CFC.	☞ Choloroflouro carbons.
• Students do not know denitrifying bacteria.	☞ It liberates nitrogen from nitrites and nitrates.
• Students are not able to identify correct values in value based questions on natural resources.	☞ Do lot of practice of value based questions and derive the values.

REVISION CHART

