Class 9th

SCIENCE

NATURAL RESOURCES

NATURAL RESOURCES

- Earth is the only one on which life exists. The resources of the earth are land, water and air. Other resources include fossil fuels, sunlight, wind, minerals,
- Things which are useful to humans or can be transformed into a useful product is called a resource and we obtain this from nature, it is known as natural resources.
- Resources can be physical (e.g., air, water, soil, minerals, coal, petroleum) or biological (e.g., microorganisms, plants and animals).
- Living things constitute the biotic or living components of the biosphere while air, water and soil form the non-living or abiotic components.

1. AIR

(A) Composition

An atmosphere is a layer of gases that surrounds a planet. Air is a mixture of various gases such as Nitrogen (about 78%), Oxygen (approximately 21 %), with some amounts of carbon dioxide, carbon monoxide, Helium, Argon etc.

(B) Importance of atmosphere

(I) It acts as blanket.

- The atmosphere is an envelope of gasses that surround the earth.
- It acts as a protective blanket as it forms a thin layer around the earth.
- It protects the entities on earth from the sun which produces harmful radiations.

(II) It helps in climate control

The atmosphere absorbs the heat reflected by the surface of earth.

It captures the heat due to the presence of greenhouse gases.

The atmosphere keeps the average temperature of Earth steady. It slows down the escape of heat into outer space during the night and prevents a sudden increase in temperature during the day.

(C) Cause of wind

Land breeze

(i) Movement of wind from land towards sea.

(ii) Experienced during winter and autumn season due to cooler nights.

(iii) Temperature may remain the same when land breeze occurs.

(iv) Usually dry wind blows.

Sea breeze

(i) Movement of wind from massive water bodies.

(ii) experienced during spring and summer because of the differences between land and water.

(iii) There is a decrease in the temperature of air.

(iv) Sea breeze has more moisture because of the absorption of particles from water bodies.

(D) Rainfall

Rain is water in the form of droplets that are formed as a result of condensation of atmospheric water vapour.

Rain is a major component of the water cycle and is responsible for depositing most of the fresh water on the earth.

It provides suitable conditions for ecosystems as well as acts as a source for hydroelectric power plants and crop irrigation.

(E) Air pollution

- **Air pollution:** It is the contamination of air physical, chemical or biological agent that changes the natural characteristics of the atmosphere. For instance, household devices like chimney, vehicles, industrial effluents etc. are some of the common sources of air pollution.

• **Causes:**	• **Effects**	• **Ways to curb**
(i) Burning of fossils (ii) Industrial emission (iii) forest fire (iv) Microbial decaying process (v) Transportation (vi) Construction and demolition (vii) Burning of garbage	(i) Deteriorate health of humans: It causes serious respiratory problems like asthma, lung disease etc. (ii) Greenhouse effect: It is a phenomenon where the temperature of earth's surface increases along with the lowest layer of the atmosphere. It is caused by carbon dioxide, methane, ozone, water vapour, etc. They are known as greenhouse gases where carbon dioxide is the most important gas in this effect. They prevent heat from escaping into space. (iii) Global warming: It is a consistent upsurge in the earth's average temperature denoted by increasing global surface temperature caused or influenced by the interrupted emissions of greenhouse gases. Over 90 % of the air gets polluted by carbon dioxide and CFCs like methane and nitrous oxide and other air pollutants affecting the climate sensitivity and levels of precipitation of the planet.	(i) Using CNG instead of petrol or diesel in vehicles. (ii) Using public transport instead of private vehicles. (iii) Practising car pooling (iv) Minimising the use of fossil fuels (v) Avoid burning of garbage (vi) Plant more trees (vii) Using air purifiers in chimneys.

(F) Causes of global warming

(i) Greenhouse gases like methane, nitrous oxide and most prominently carbon dioxide along with other air pollutants is the main cause of global warming.

(ii) Effects of global warming

(A) Increase in sea levels

(B) Changes in precipitations

(C) Increased intensity of storms

(iii) Acid rain: Any form of precipitations like rain, snow, hail etc. with acidic components (includes sulphuric acid or nitric acid) is called acid rain. It can lead to many harmful effects like corrosion of monuments.

For eg: Taj Mahal is turning yellow due to acid rain as it reacts with marble and turns it yellow.

(G) Ozone layer

- The ozone layer is a thin part of the Earth's atmosphere, which functions as a shield over the Earth's stratosphere and absorbs the greatest amount of the Sun's ultraviolet (UV) radiation.
- The ozone layer comprises high concentrations of ozone (O3) in relation to other parts of the atmosphere.
- It is measured in terms of Dobson units (DU). Thinning of the ozone layer is called an ozone hole.

(H) Cause of ozone depletion

Causes	Effects	Ways to curb depletion
Activities of human are the main cause of depletion of the ozone layer due to over due to over use of the man-made chemicals which contains bromine and chlorine. Some of the examples of such compounds are follow: 1. Chlorofluorocarbons (CFCs) 2. Methyl chloroform 3. Carbon tetrachloride 4. Hydro-chlorofluorocarbons	The depletion of ozone imposes harmful effects on the environment. 1. Humans are directly exposed to ultraviolet radiations of the sun because of the depletion of the ozone layer. This can lead to serious health issues such as skin cancer, sunburns, cataract, quick ageing and weak immune systems.	Depletion of ozone is a serious issue. 1. Avoid using ozone depleting substances (ODS) 2. Minimising using vehicles. 3. Using eco-friendly cleaning products. 4. Use of nitrous oxide should be prohibited.

2. WATER: A NATURAL RESOURCE

Role of water in everyday life: Water forms two-thirds of our body; it keeps the body's temperature normal. It is also used for agricultural purposes, Domestic Purposes, Industrial Purposes, etc. Distribution of water on earth: Only 3% of the water on the surface is fresh, and the remaining 97% resides in the ocean.

(A) Water Pollution

The contamination of water bodies, usually as a result of human activites, in a manner that negatively affects its legitimate use is called water pollution. It reduces the ability of the water to provide the ecosystem services.

Causes	Effects	Ways to curb
1. Improper sewage disposal 2. Oil spills 3. Fertilisers 4. Dumping of chemical & radioactive waste 5. Urban development	1. Drinking polluted water can have disastrous effects on our health. I t can leads to diseases like typhoid, Cholera, hepatitis etc. Discharging untreated sewage into water bodies can also lead to water pollution. 2. Ecosystem destruction 3. 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.	1. Treating the waste from sewage before releasing them in water bodies. 2. Avoid throwing garbage in lake and ponds. 3. Avoid spilling oil in sink. 4. Using eco-friendly products.

(B) Rainwater harvesting

- The process of collecting rainwater during the rainy season, to meet our fresh water requirements in the dry season, is called rain harvesting.
- One of the most widely used methods of collecting rain water is rooftop rainwater harvesting. In rooftop rainwater harvesting systems, rainwater falling on the water is roof is collected and then filtered before being stored in the tanks for immediate use. Excess water is diverted to wells to recharge ground water.

3. SOIL

Soil is a biologically active, porous medium present on the uppermost layer of Earth's crust.

It is one of the principal substrate of life which serves as a reservoir of water and nutrients, as a participant in the cycling of carbon and other elements through the global ecosystem.

(A) Composition

The basic components of soil are minerals, organic water. The typical soil consists of approximately 45 % mineral, 20-30 % air and 5 % organic matter.

(B) Process of soil formation

(i) Physical - In this process breakdown of rocks into smaller pieces takes place. Wind, water, sun helps in this process.

(ii) Chemical- Here, breakdown of rocks takes place through chemicals present in water and air. It yankees place in warmer are where humidity is high.

(iii) Biological- In this process weathering occurs with the help of plants and microorganisms,

(C) Soil pollution

It is defined as the presence of toxic chemicals or substances like pesticides, fertilizers, heavy metals like lead etc. in the natural soil environment.

Cause	**Effect**	**Ways to curb**
(i) **Industrial activity:** Activities like mining and manufacturing have led to this problem as most of the industries are dependent on it. This process leads to the contamination of soil during the extraction process. (ii) **Disposal of waste:** These days some parts of land dis used as dumping ground where household and industrial waste are thrown. Through rain these chemicals slowly seeps into the soil and contaminates it. (iii) **Acid rain:** When the pollutants like sulphur and nitrogen oxides present in the air mix with water droplets and fall back on earth as rainfall. (iv) **Agricultural activities:** Chemical present in pesticides and fertilizers, since these chemicals are not produced naturally. They seeps into the soil and reduces the fertility of soil.	(i) Crops grown on polluted soil absorb most of the pollutants. These crops when consumed by humans can cause respiratory disease, skin problems, vomiting, headaches etc. (ii) Soil harbour a lot of microorganisms and insects. Therefore, change in the chemistry of soil can have negative impact on these organisms.	(i) Use eco-friendly products in industries and agriculture. (ii) Proper management mining waste. (iii) Proper waste disposal (iv) Regular assessment of soil

(D) Soil erosion

It is a natural phenomenon in which the top fertile layer of soil is washed away by a natural forces such as wind and water.

Causes	Effects	Ways to curb
1. Over grazing & deforestation 2. Unscientific methods of cultivation 3. Fast blowing wind, surface runoff 4. Deforestation, building dams etc.	1. Makes land unsuitable for cultivation. 2. It causes land slides. 3. Loss of biodiversity, degradation of ecosystem	1. Construction of small water storage units in water eroded areas. 2. Preparation of the shelter belt of plants. 3. Control overgrazing of animals. 4. Practising afforestation which means planting of trees.

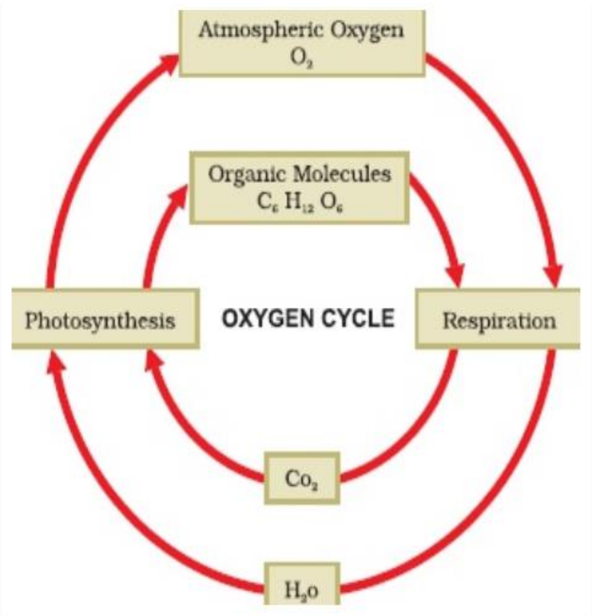
4. BIOGEOCHEMICAL CYCLE

It is a natural pathway by which essential elements of living matter are circulated. Biogeochemical is a term that refers to the consideration of the biological, geological and chemical aspects of each cycle involved in it.

(i) Gaseous cycles: Includes carbon, oxygen and nitrogen etc.

(ii) Sedimentary cycles: Includes sulphur, phosphorus, rock cycle, etc.

(A) Oxygen cycle



(i) Oxygen is an abundant element on our earth.

(ii) It is found in the elemental form in the atmosphere to the extent of 21 %.

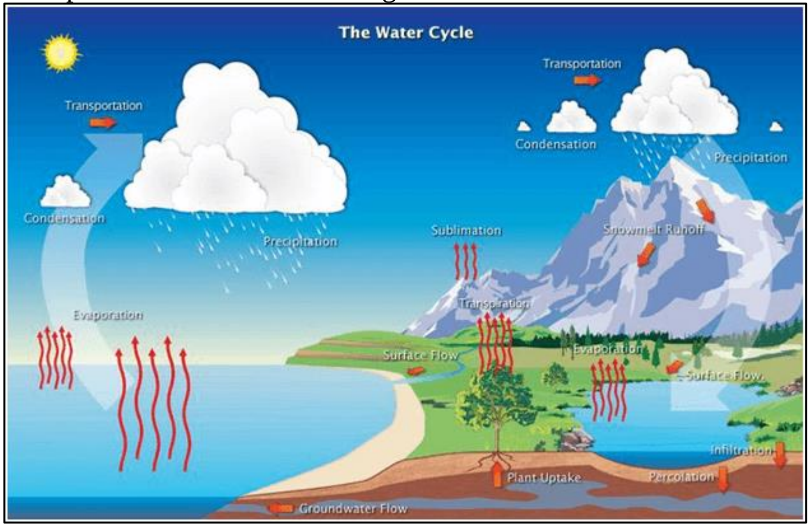
(iii) Oxygen is released by the plants during photosynthesis.

(iv) Humans and other animals inhale oxygen and exhale carbon dioxide which is again taken up by the plants.

(v) Plants utilise the carbon dioxide in photosynthesis to produce oxygen, and the cycle continues.

(B) Water Cycle

- The water cycle, also known as the hydrologic cycle, is the continuous movement of water from the earth's surface to the atmosphere and then back to the ground.



(i) This biogeochemical cycle is responsible for maintaining weather conditions.

(ii) In this cycle the water from the different water bodies evaporates called evaporation, cools, condenses and falls back to the earth as rain.

(iii) The water in its various forms interacts with the surroundings and changes the temperature and pressure of the atmosphere.

(iv) There's another process called transpiration which aids this process animals also release some amount of vapour during respiration.

(v) It is the evaporation of water from the leaves, soil and water bodies to the atmosphere which again condenses and forms clouds and then falls as rain.

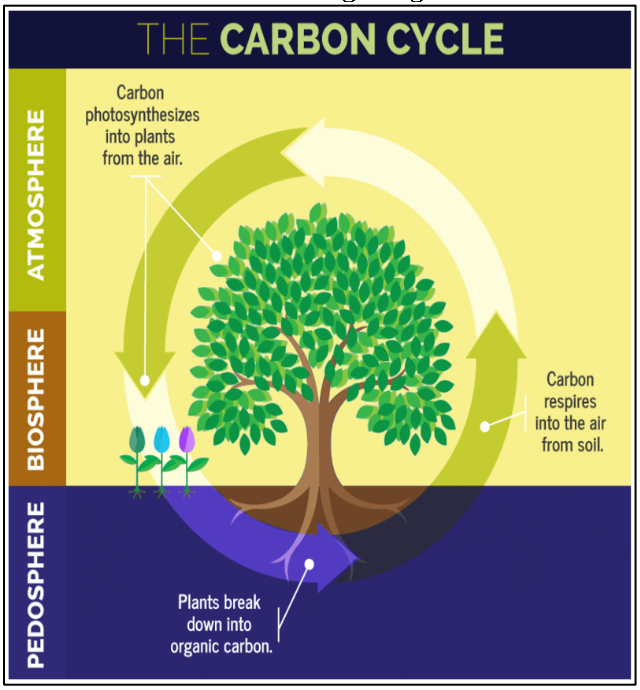
(C) Carbon

Carbon is a chemical element with the symbol C. It is a nonmetallic chemical element found in various forms:

1. In Elemental forms- Diamond, graphite
2. In Combined form-carbon dioxide, carbonates
3. Carbon-containing molecules are proteins, carbohydrates, fats, nucleic acids, vitamins

CARBON CYCLE

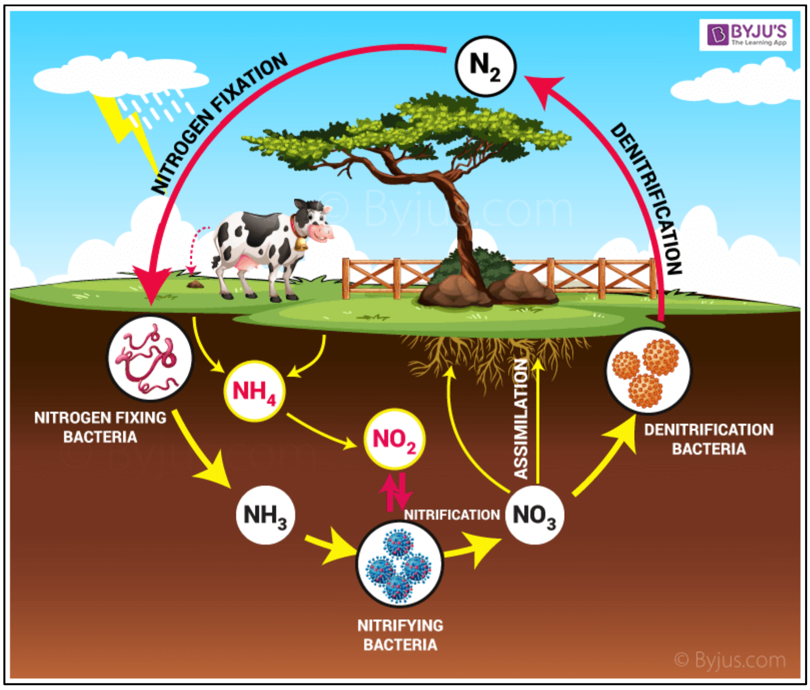
The circulation and transformation of carbon between living things and the environment is called the Carbon Cycle.



(i) In carbon cycles carbon is exchanged among the biosphere, geosphere, hydrosphere, atmosphere and pedosphere (outermost layer of earth made up of soil and subject to soil formation).
(ii) Green plants uses carbon dioxide and sunlight for photosynthesis.
(iii) Carbon is thus stored in the plant. The green plants, when dead, are buried into the soil that gets converted into fossil fuels made from carbon.
(iv) These fossil fuels, when burnt, release carbon dioxide into the atmosphere.
(v) In this way the animals that consume plants also obtain the carbon stored in the plants.
(vi) This carbon is returned to the atmosphere when the dead body of the animals decomposes.

(D) Nitrogen Cycle

The nitrogen cycle is the recycling and reusing of nitrogen in different forms to meet the demands of various environmental activities.



(i) In nitrogen cycle nitrogen is converted into several forms and it gets circulated through the atmosphere and various ecosystems such as terrestrial and marine ecosystems.
(ii) Nitrogen is a vital element of life as it is important part of amino cid which are building blocks of protein and nucleic acid which forms genetic material of cell.
(iii) The nitrogen fixation takes place in the atmosphere by the nitrogen-fixing bacteria present in the root nodules of the leguminous plants and made available to the soil and plants. The fixation of nitrogen takes place in the absence of oxygen as its presence can hinder the process. Fixation can also be accomplished by some free living bacteria in soil.
(iv) Nitrogen gas is converted into a usable compound called ammonia by the bacteria present in the roots of the plants.
(v) Ammonia is also supplied to plants in the form of fertilizers.
(vi) This ammonia is converted into nitrites and nitrates. Plants use nitrogen usually in the form of nitrate, however some can also use ammonia.
(vi) The denitrifying bacteria reduce the nitrates into nitrogen and return it into the atmosphere.