Environmental Segments

Environment

Environment is defined as the social, cultural and physical conditions that surround, affect and influence the survival, growth and development of people, animals or plants. Environment includes everything around us. It encompasses both the living (biotic) and non-living (abiotic) components of the Earth.

- Environment is divided into the following segments:
- 1. Lithosphere
- 2. Hydrosphere
- 3. Atmosphere
- 4. Biosphere

1. Lithosphere:

Lithosphere is related with edaphic factor. The solid component of earth is known as lithosphere. Lithosphere means the mantle of rocks constituting the earth's crust.

- It includes the soil, which covers the rock crust.
- Soil plays an important role as it provides food for man and animals.
- Soil is usually defined as "any part of earth's crust in which plants root."
- Muddy bottoms of ponds, ravines or glacial deposits, porous rock surface, bottoms of lakes peat etc., all are thus soil.
- A typical productive soil contains approximately 95 per cent inorganic matter and 5 per cent organic matter. Organic matter in the soil provides food for microorganism. This matter includes amino sugars, organic sulphur, organic phosphate, and polysaccharides.
- Soil contains silicate minerals, which includes nearly 74 per cent Silicon and Oxygen, common elements in the soil are 46.4 per cent Oxygen, Silicon 27.7 per cent, Aluminium 8.1 per cent, Iron 5.6 per cent, Calcium 3.6 per cent, Sodium 2.8 per cent, Potassium 2.6 per cent, Magnesium 2.1 per cent. In some soils, manganese oxide and titanium oxide are also available.

2. Hydrosphere:

This includes all the surface and ground water resources such as oceans, seas, rivers, streams, lakes, reservoirs, glaciers, polar ice caps, ground water and water locked in rock and crevices and minerals laying deep below the earth's crust.

- Earth is called blue planet because 80 per cent of its surface is covered by water (97 per cent of the earth's water resources is locked up in the oceans and seas, 2.4 per cent is trapped is giant glaciers and polar ice caps.)
- Water is universal solvent.
- Water is also the main medium by which chemical constituents are transported from one part of an ecosystem to others.
- Water has high specific heat, latent heat and relatively high freezing point.
- Surface water contains a lot of organic matter and mineral nutrients, which feed large bacteria population and algae.

3. Atmosphere:

The gaseous envelope surrounding the earth is composed of an entire mass of air containing N_2, O_2, H_2O, CO_2 and inert gases is known as atmosphere.

- The atmosphere is a reservoir of several elements essential to life and serves many purposes and functions.
- The atmosphere is mobile, elastic, compressible and expansible.
- Atmosphere serves many purposes and functions.
- It absorbs most of the harmful radiations.
- It maintains the heat balance of the earth.
- Different cycles those are present in the atmosphere in the form of water cycle, carbon, oxygen, nitrogen cycle etc. related to the movement of matter been an organism and its environment.
- Atmosphere can be divided into several layers on the basic of temperature variations. They are troposphere, stratosphere, mesosphere and thermosphere.

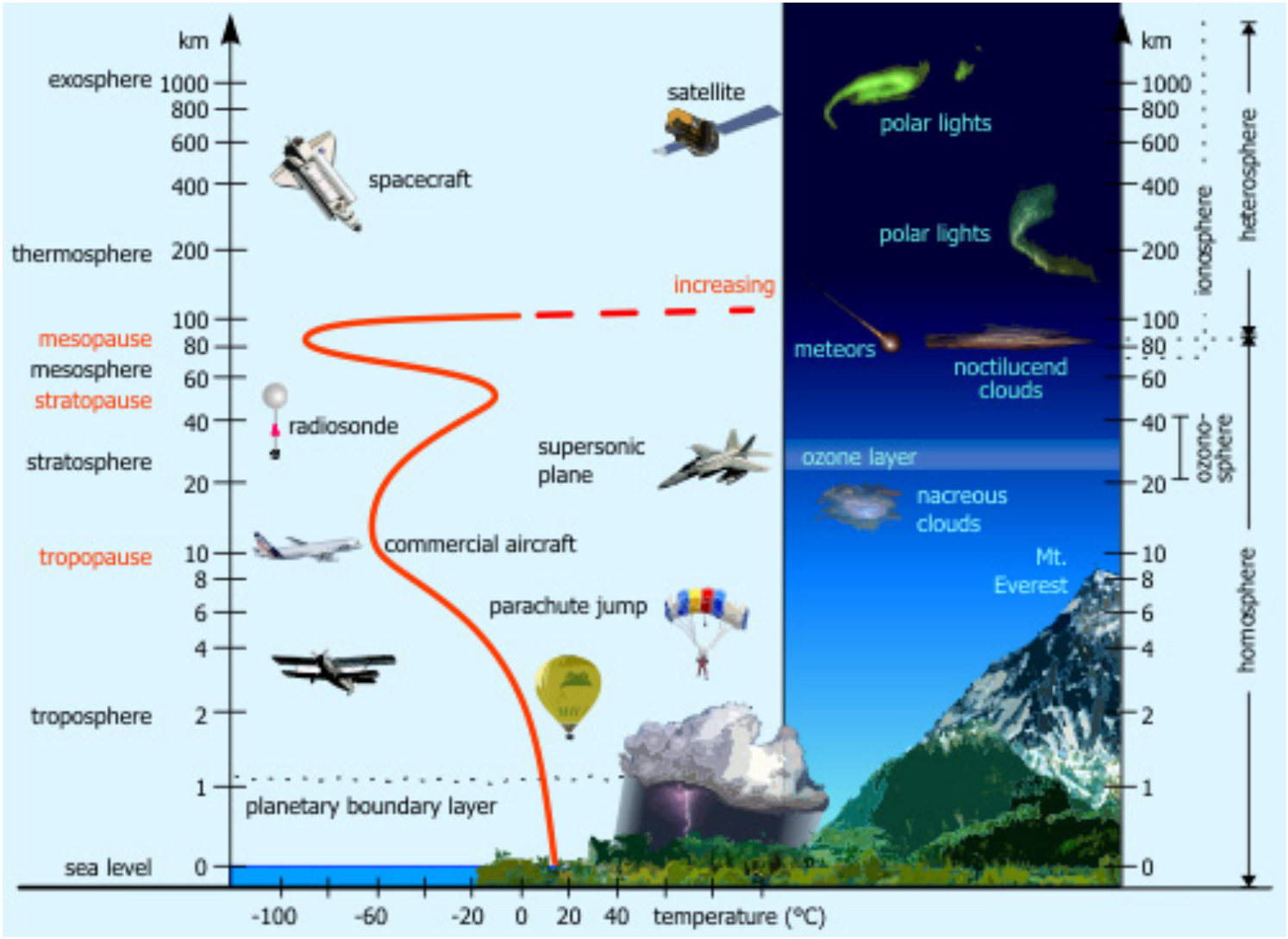
4. Biosphere:

The biosphere is the global sum of all the ecosystems.

- Biosphere is biological envelope that surrounds the globe, containing and able to support.
- It penetrates into and is dependent on the atmosphere, hydrosphere and lithosphere. This denotes the relating of living organism and their interactions with the environment. The biosphere is a relatively thin and incomplete envelope covering most of the world.

Structure and Composition of Atmosphere

Structure of Atmosphere



The Atmosphere is divided into layers according to major changes in temperature. Gravity pushes the layers of air down on the earth's surface. This push is called air pressure. 99% of the total mass of the atmosphere is below 32 kilometers.

Troposphere - 0 to 12 km - Contains 75% of the gases in the atmosphere. This is where we live and where weather occurs. As height increases, temperature decreases. The temperature drops about 6.5 degrees Celsius for every kilometer above the earth's surface.

Tropopause - located at the top of the troposphere. The temperature remains fairly constant here. This layer separates the troposphere from the stratosphere. We find the jet stream here. These are very strong winds that blow eastward.

Stratosphere - 12 to 50 km - in the lower part of the stratosphere. The temperature remains fairly constant (-60 degrees Celsius). This layer contains the ozone layer. Ozone acts as a shield for in the earth's surface. It absorbs ultraviolet radiation from the sun. This causes a temperature increase in the upper part of the layer.

Stratopause: The boundary between the stratosphere and the mesosphere, located at an altitude of about 50 km above the Earth's surface. The transitional zone of maximum temperature between the stratosphere and the mesosphere.

Mesophere - 50 to 80 km - in the lower part of the stratosphere. The temperature drops in this layer to about -100 degrees Celsius. This is the coldest region of the atmosphere. This layer protects the earth from meteoroids. They burn up in this area.

Mesopause: The boundary between the upper **mesosphere** and the lower **thermosphere**, approximately 80 km above the Earth's surface. It is the site of the coldest temperatures in the Earth's atmosphere, with temperatures of -100°C. the top of the mesosphere, determined by the appearance of a temperature minimum near an altitude of 80 km.

Thermosphere - 80 km and up - The air is very thin. Thermosphere means "heat sphere". The temperature is very high in this layer because ultraviolet radiation is turned into heat. Temperatures often reach 2000 degrees Celsius or more.

Thermosphere layer contains:

Ionosphere - This is the lower part of the thermosphere. It extends from about 80 to 550 km. Gas particles absorb ultraviolet and X-ray radiation from the sun. The particles of gas become electrically charged (ions). Radio waves are bounced off the ions and reflect waves back to earth. This generally helps radio communication. However, solar flares can increase the number of ions and can interfere with the transmission of some radio waves.

Exosphere - the upper part of the thermosphere. It extends from about 550 km for thousands of kilometers. Air is very thin here. This is the area where satellites orbit the earth.

Magnetosphere - the area around the earth that extends beyond the atmosphere. The earth's magnetic field operates here. It begins at about 1000 km. It is made up of positively charged protons and negatively charged electrons. This traps the particles that are given off by the sun. They are concentrated into belts or layers called the Van Allen radiation belts. The Van Allen belts trap deadly radiation. When large amounts are given off during a solar flare, the particles collide with each other causing the aurora borealis or the northern lights.

Composition of Atmosphere

Nitrogen - 78% - Dilutes oxygen and prevents rapid burning at the earth's surface. Living things need it to make proteins. Nitrogen cannot be used directly from the air. The Nitrogen Cycle is nature's way of supplying the needed nitrogen for living things.

Oxygen - 21% - Used by all living things. Essential for respiration. It is necessary for combustion or burning.

Argon - 0.9% - Used in light bulbs.

Carbon Dioxide - 0.03% - Plants use it to make oxygen. Acts as a blanket and prevents the escape of heat into outer space. Scientists are afraid that the buring of fossil fuels such as coal and oil are adding more carbon dioxide to the atmosphere.

Water Vapor - 0.0 to 4.0% - Essential for life processes. Also prevents heat loss from the earth.

Trace gases - gases found only in very small amounts. They include neon, helium, krypton, and xenon.