Environmental Engineering

1st Course

2nd Year

Water Resources Engineering Department

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by

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M Sc- Water Resources Engineering

B Sc Civil Engineering

Environment

The natural environment encompasses all living and non-living things occurring naturally, meaning in this case not artificial. The term is most often applied to the Earth or some parts of Earth. This environment encompasses the interaction of all living species, climate, weather and natural resources that affect human survival and economic activity.

Environment consist of:

- **BIOTIC FACTORS** = living components in an environment
- **ABIOTIC FACTORS** = non-living components in an environment

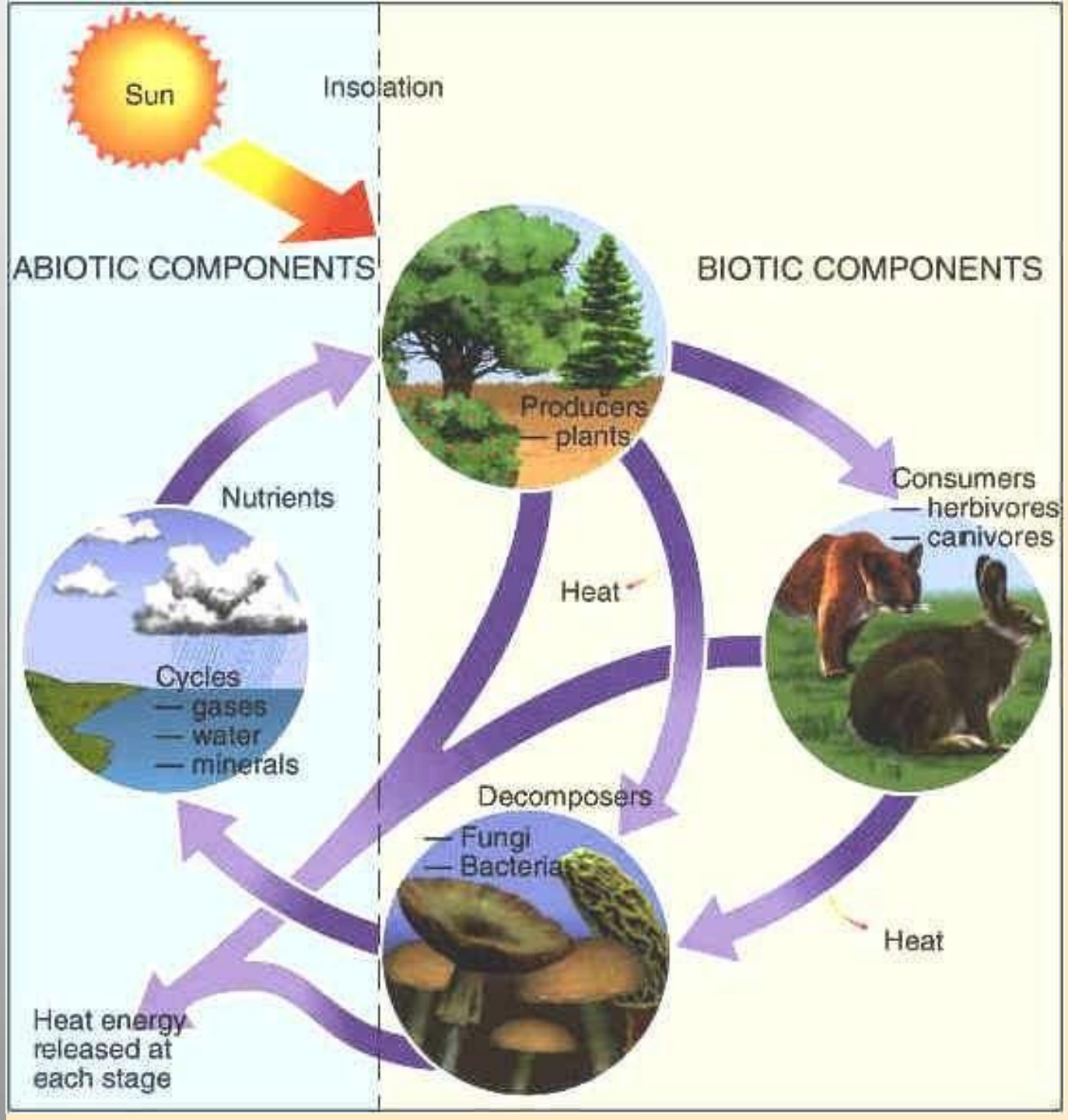
- **Biotic factors** and **Abiotic factors** that surround us and with which we interact.
- These biotic and abiotic components are in dynamic state; they constantly affect each other and cannot be isolated from each other.

Biotic Factors

- *All living organisms*
- *Plants*
- *Animals*
- *Microorganisms*

Abiotic Factors

- *Water, soil, minerals, gases*
- *Temperature, humidity, wind*
- *Light, nutrients (C, O, P, N, etc.)*



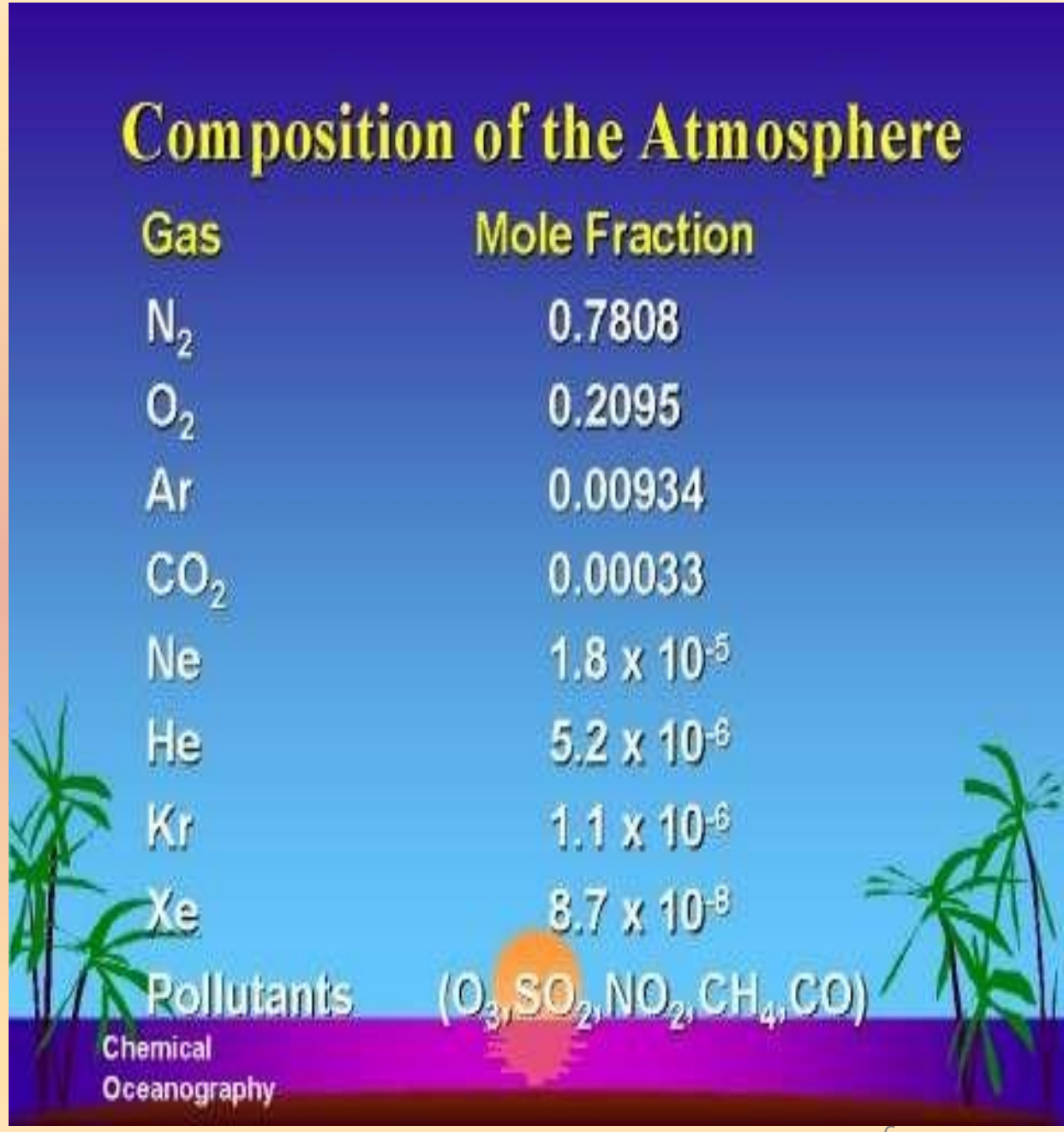
Environment Spheres

It is the entirety of earth minus the set of human activities. It includes various interacting systems called "spheres". The spheres are:

1. Atmosphere
2. Hydrosphere
3. Lithosphere
4. Biosphere
5. Cryosphere
6. Anthroposphere

1.Atmosphere

It is the mixture of various gases, water vapor and subatomic particles that entirely covers the earth extending outward several thousand kilometers.



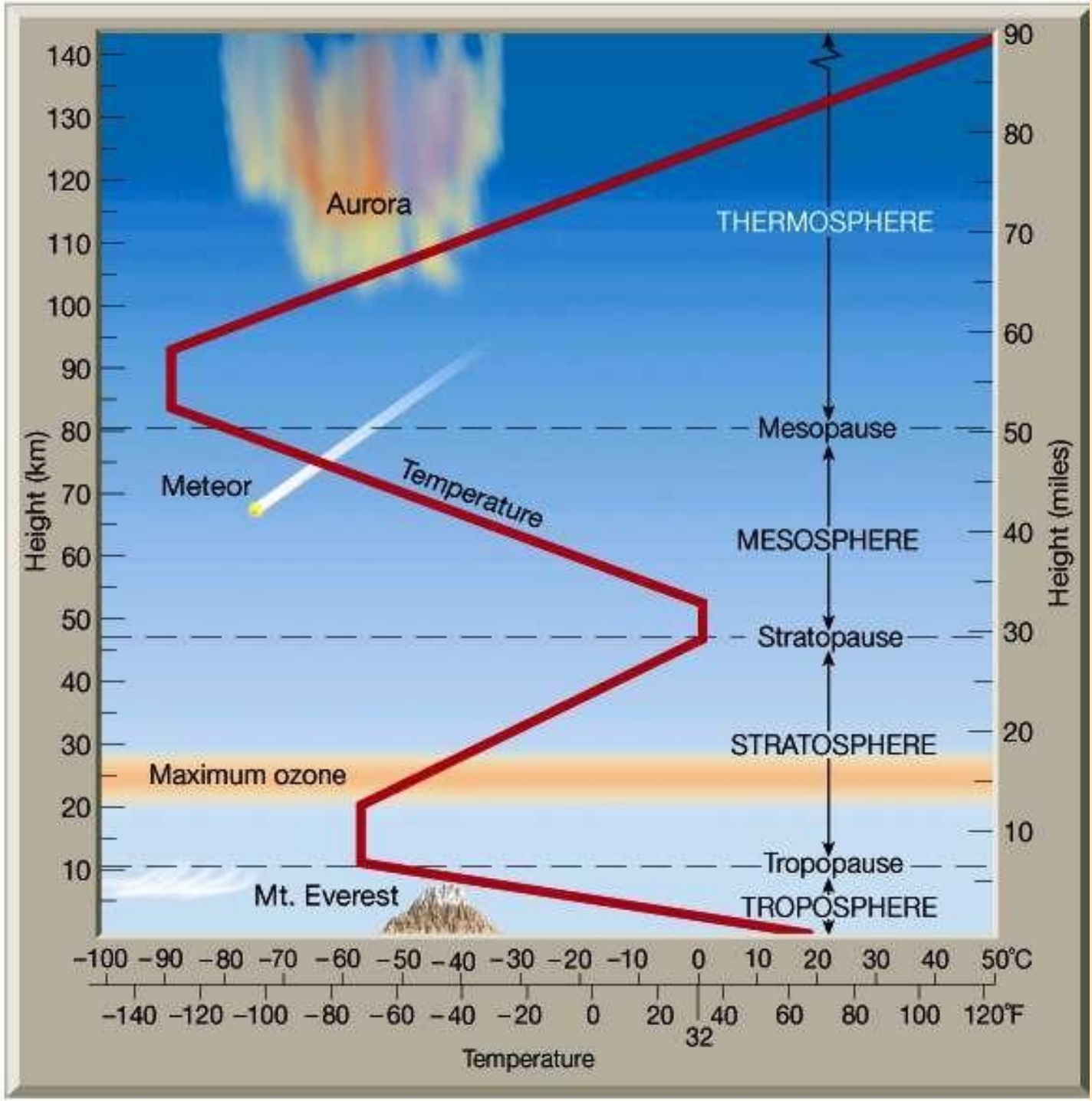
Structure of atmosphere

Troposphere

Mesosphere

Thermosphere

Exosphere



2.Hydrosphere

About 70% of earth is covered by water. Water is available in seas, oceans, lakes, river, glaciers etc.

97% is in the oceans and seas, 2% in glaciers & ice caps, 1% is fresh water available for human consumption.

3. Lithosphere:

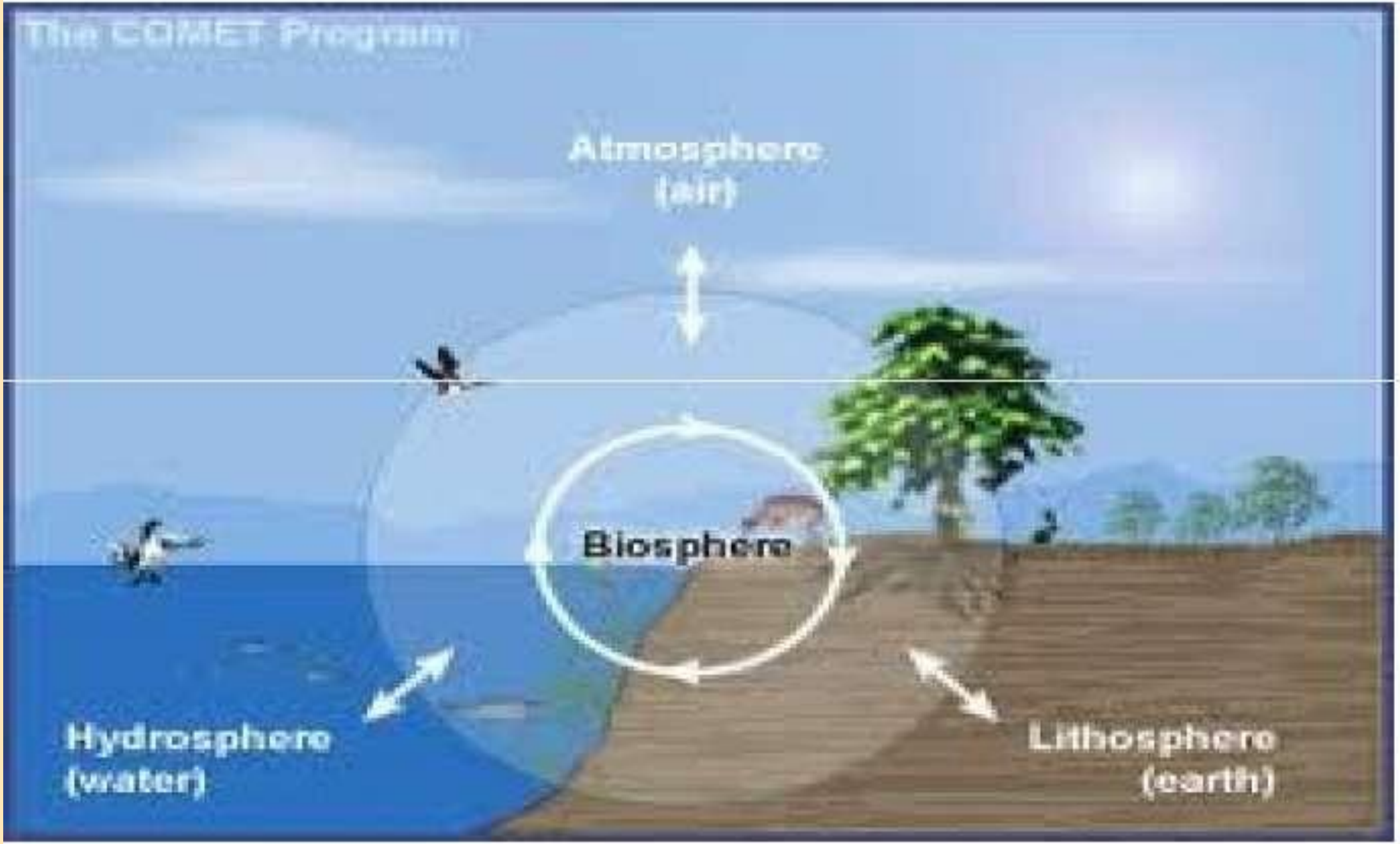
- Outer soil crust of the earth is lithosphere
- Living organisms, plant vegetation are supported by the lithosphere.
- It contains resources like minerals, organic and inorganic matter, some extent air and water.
- Role of lithosphere:

  -Produces food for human beings and animals.

  - Soil is the site of decomposition of organic wastes.

4. Biosphere:

- Thin outer crust of the earth which includes all the living organisms and their environment.
- It extends from the lowest sea bed level to about 24 km of the atmosphere.
- Life supporting resources are available from the biosphere.
- It is that part of earth where living (biotic) organism exist and interact with each other and also with non-living (abiotic) components.

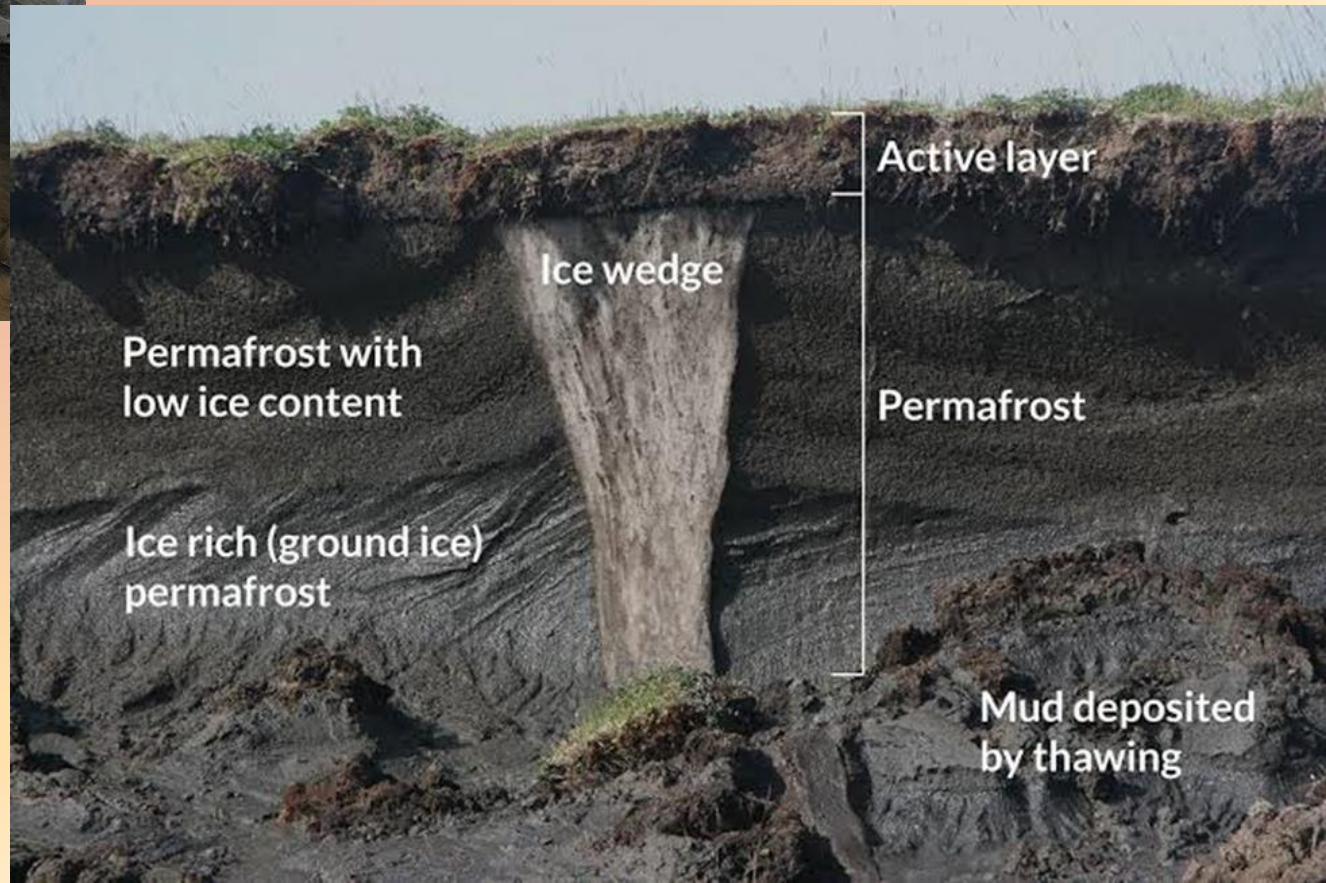

The COMET Program
Atmosphere
(air)
Biosphere
Hydrosphere
(water)
Lithosphere
(earth)

5. The Cryosphere

is an all-encompassing term for those portions of Earth's surface where water is in solid form, including sea ice, lake ice, river ice, snow cover, glaciers, ice caps, ice sheets, and frozen ground (which includes permafrost). Thus, there is a wide overlap with the hydrosphere. The cryosphere is an integral part of the global climate system with important linkages and feedbacks generated through its influence on surface energy and moisture fluxes, clouds, precipitation, hydrology, atmospheric and oceanic circulation. Through these feedback processes, the cryosphere plays a significant role in the global climate and in climate model response to global changes. The term deglaciation describes the retreat of cryospheric features. Cryology is the study of cryosphere.


Snow
Atmosphere
Sea ice
The Cryosphere
Glaciers
Ocean
Rivers
Frozen ground

permafrost


Active layer
Ice wedge
Permafrost with
low ice content
Permafrost
Ice rich (ground ice)
permafrost
Mud deposited
by thawing

6. The Anthroposphere

(sometimes also referred as **Technosphere**) is that part of the environment that is made or modified by humans for use in human activities and human habitats. It is one of the Earth's spheres It has been estimated that as of 2016 the total weight of the anthroposphere - that is, human generated structures and systems - was 30 trillion tons.

Environmental Pollution :

It is the contamination of the environment with substances that are potentially injurious to human, plant and animal life of the quality of that life.

The term pollutant reserves for a substance that has a demonstrated adverse effect on human or ecological health.

Environmental Quality :

It is a set of properties and characteristics for measuring an environment condition relative to the human and other creations requirements.

Environmental Engineer :

The environmental engineer is a professional man in applying scientific principles and technological means to avoid or reduce forms of pollution by human activities.

Role of Environmental Engineering :

1.Identification of an adverse receptor effect.
2.Determination of the substances causing that effect and estimation of the threshold concentration.
3.Identification of the source of the polluting substance.
4.Estimation of the mixing and transformation processes between source and receptor.
5.Control of the source to achieve the safe emission level.

Wastes Types :

1.Liquid wastes: such as, sewage, chemical wastes.
2.Solid wastes: such as, domestic wastes, demolition, industrial wastes.
3.Air wastes: such as, carbon monoxide, nitrogen oxides, sulfur dioxide.
4.Noise from machines, vehicles.
5.Radiation wastes.
6.Pesticides.