BIOSPHERE: Hydrosphere, Biosphere, Atmosphere

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The biosphere is the biological component of earth systems, which also include the lithosphere, hydrosphere, atmosphere and other "spheres" (e.g. cryosphere, anthrosphere, etc.). The biosphere includes all living organisms on earth, together with the dead organic matter produced by them.

Before the coming of life, Earth was a bleak place, a rocky globe with shallow seas and a thin band of gases—largely carbon dioxide, carbon monoxide, molecular nitrogen, hydrogen sulfide, and water vapour. It was a hostile and barren planet. This strictly inorganic state of the Earth is called the geosphere; it consists of the lithosphere (the rock and soil), the hydrosphere (the water), and the atmosphere (the air). Energy from the Sun relentlessly bombarded the surface of the primitive Earth, and in time—millions of years—chemical and physical actions produced the first evidence of life: formless, jelly like blobs that could collect energy from the environment and produce more of their own kind. This generation of life in the thin outer layer of the geosphere established what is called the biosphere, the “zone of life,” an energy-diverting skin that uses the matter of the Earth to make living substance.

The biosphere is a system characterized by the continuous cycling of matter and an accompanying flow of solar energy in which certain large molecules and cells are self-reproducing. Water is a major predisposing factor, for all life depends on it.

The elements carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur, when combined as proteins, lipids, carbohydrates, and nucleic acids, provide the building blocks, the fuel, and the direction for the creation of life. Energy flow is required to maintain the structure of organisms by the formation and splitting of phosphate bonds. Organisms are cellular in nature and always contain some sort of enclosing membrane structure, and all have nucleic acids that store and transmit genetic information.

All life on Earth depends ultimately upon green plants, as well as upon water. Plants utilize sunlight in a process called photosynthesis to produce the food upon which animals feed and to provide, as a by-product, oxygen, which most animals require for respiration. At first, the oceans and the lands were teeming with large numbers of a few kinds of simple single-celled organisms, but slowly plants and animals of increasing complexity evolved. Interrelationships developed so that certain plants grew in association with certain other plants, and animals associated with the plants and with one another to form communities of organisms, including those of forests, grasslands, deserts, dunes, bogs, rivers, and lakes. Living communities and their nonliving environment are inseparably interrelated and constantly interact upon each other. For convenience, any segment of the landscape that includes the biotic and a biotic components is called an ecosystem. A lake is an ecosystem when it is considered in totality as not just water but also nutrients, climate, and all of the life contained within it. A given forest, meadow, or river is likewise an ecosystem. One ecosystem grades into another along zones termed eco tones, where a mixture of plant and animal species from the two ecosystems occurs. A forest considered as an ecosystem is not simply a stand of trees but is a complex of soil, air, and water, of climate and minerals, of bacteria, viruses, fungi, grasses, herbs, and trees, of insects, reptiles, amphibians, birds, and mammals.

The area near the surface surface of the earth can be divided up into four inter-connected geo-spheres that make up the carbon cycle these include the : Lithosphere

- Hydrosphere
- Biosphere
- Atmosphere

The understanding of '-sphere- in this situation means 'to surround or encompass' The following help us understand the mean of the four spheres :

- **Litho**sphere - litho referring to rocks and minerals
- **Hydro**sphere - hydro referring to water
- **Bio**sphere - bio referring to life
- **Atmo**sphere - atmo referring to steam and vapor

THE LITHOSPHERE -

It is believed the lithosphere evolved about 4.6 billion years ago. The lithosphere refers to the solid, rocky crust that covers the entire planet. This solid, rocky crust is composed of a number of different rocks that have been hrouped into three categories based on how they are formed. These three groups include: Metamorphic rocks – Metamorphic rocks are formed by heat and / or pressure from pre-existing rocks.

- Igneous rocks – igneous rocks are formed by the cooling of hot molten rock also known as magma. When the hot magma cools it begins to harden meaning once it had fully cooled it create what is known to be an igneous rock.

- Sedimentary rocks – sedimentary rocks are formed from pre-existing rocks. When rocks erode and mix with other dirt, clay and particles then settle together the mix together to form a sedimentary rock.

The lithosphere includes a various number of different landforms such as mountains, valleys, rocks, minerals and soil. The lithosphere is constantly changing due to forces and pressures such as the sun, wind, ice, water and chemical changes.

The earth's surface is composed into two types of lithospheres. There are known as the oceanic and continental lithospheres.

The oceanic lithosphere includes the uppermost layers of mantle which is topped with a thin yet heavy oceanic crust. This is where the hydrosphere and lithosphere meet.

The continental lithosphere include the uppermost layers of mantle which is topped with a thick yet light continental crust. This is where the atmosphere, biosphere and hydrosphere meet the lithosphere.

THE HYDROSPHERE -

The hydrosphere refers to the most important resource which I water. The hydrosphere includes all forms of water in the Earth's environment. The forms of water include things such as the ocean, lakes, rivers, snow and glaciers, water underneath the earth's surface and even the water vapour that is found in the atmosphere. The hydrosphere is always in motion as seen through the movement and flow of water in rivers, streams and the ocean (beach). Plant and animal organisms rely on the hydrosphere for their survival as water is essential. The hydrosphere is also home to many plants and animals and it believed that the hydrosphere covers approximately 70% of the earth's surface

THE ATMOSPHERE -

The atmosphere referrers to the air that surrounds the earth. The atmosphere is always in motion and constantly changing. It's believed that there are about 14 different gases that make up the atmosphere. The atmosphere is also responsible for the weather as the weather occurs within the lower atmosphere.

The bottom layer of the atmosphere is known as the troposphere. The troposphere is where the weather happens. It is the warmest near the Earth because of the heat rising from the earth's surface but it becomes colder with altitude. This layer is separated from the next by what is know s as tropopause. The tropopause is the point in which temperatures will begin to change due to the increase of altitude.

Above the tropopause is the stratosphere. The stratosphere is where there large concentration of ozone gas is found. The ozone gasses are essential as they absorb a large percent of radiant solar energy, protecting the earth from harmful ultra violet rays also known as UV.

The coldest of spheres is known as the mesosphere this is where the water vapor often freezes to create clouds that are purely made of ice. The mesosphere is separated from the thermosphere by the mesopause.

The top most layer is known as the thermosphere, this is where many satellites circle the earth. Due to the thin air and proximity of the sun, the temperatures in the thermosphere tend to rapidly increase and decrease.