

Concept of Biosphere

(Lithosphere, Hydrosphere and Atmosphere)

Any living plant or animal is called an 'organism'. The living organisms exist in a variety of habitats (living places) like land, water and air. The earth has land surface, water and air which support living organisms like plants and animals. A zone consisting of land, water and air where life exists is called 'biosphere'.

The biosphere concept is common to many scientific disciplines including astronomy, geophysics, geology, hydrology, biogeography and evolution and is a core concept in ecology, earth science and physical geography. A key component of earth systems, the biosphere interacts with the external matter and energy with the other spheres, helping to drive the global biogeochemical cycling of carbon, nitrogen, phosphorus, sulphur and other elements.

From an ecological point of view, the biosphere is the global ecosystem, comprising the totality of biodiversity on earth and performing all manner of biological functions including photosynthesis, respiration, decomposition, nitrogen fixation and denitrification.

The biosphere is dynamic, undergoing strong seasonal cycle in primary productivity and the many biological processes driven by the energy captured by photosynthesis. The biosphere has evolved since the first single celled organisms. As a result of long term interactions between the biosphere and the other earth systems, there is almost no part of the earth's surface that has not been profoundly altered by living organisms.

History of the Biosphere Concept

The term 'biosphere' is originated with the geologist Eduard Suess in 1875 who defined it as 'the place on earth's surface where life dwells'. Vladimir I. Vernadsky first defined the biosphere in a form resembling its current ecological usage in his long overlooked

book of the same title, originally published in 1926. It is Vernadsky's work that redefined ecology & the science of the biosphere and placed the biosphere concept in its current central position in Earth Systems Science.

Structure and composition of Biosphere

(i) Ecology of system - Interaction of a particular group of organisms with abiotic factors within a particular habitat resulting in clearly defined energy flows and material cycles on land, water & air.

(ii) Biology - Derived from Greek word 'Oikos' meaning house and 'logos' means science. Ernst Haeckel used the term in 1869 for the first time, the study of interaction between life forms and physical environment is known as science of ecology, so it is the study of abiotic and biotic interactions.

Environment has two components

(i) Abiotic (physical and inorganic) &

(ii) Biotic (= organic)

Our structure of Biosphere has three components

Abiotic, Biotic and energy components

(i) Abiotic components - It consists of all non-living elements which are essential for the survival of all living organisms. It has

(a) Lithosphere

(b) Hydrosphere

(c) Atmosphere

(ii) Biotic components - It includes plants, animals & human beings to make biotic components of environment. These are three sub systems,

(a) Plants - They are very important part of biotic components. They are primary producers of food through process of photosynthesis. (= Autotrophs)

(b) Animals - they are main consumers of plant-producers (heterotrophs). they use organic matter produced by plants and transform the food into energy (used for growth and development).

(c) Microorganisms - they act as decomposers of dead plants and animals.

(d) Biosphere - it's vital component of biosphere which is essential for reproduction and generation of all biological life on earth.

Biological Components

(a) Lithosphere - the lithosphere is the terrestrial part of the biosphere, it consists of the solid land masses, seas, continents and islands, the deeper parts of the lithosphere, known as the lower mantle and the core, do not support life. the rest of the lithosphere supports a variety of life from bacteria to large mammals and trees hundreds of feet tall, the weathering of the lithosphere convert from soil, which provides mineral and organic waste to support life. In addition, the land provides shelter and protection from animals from weather and predators and anchor for plants.

(b) The Hydrosphere

The hydrosphere is the aquatic part of the biosphere, this includes oceans, rivers, lakes and other bodies of water. Unlike the lithosphere and atmosphere every portion of the hydrosphere supports life. specially-adapted bacteria grow in hot springs, tube worms form the basis of sulphur based communities around deep sea hydrothermal vents and in more hospitable regions, life abounds. water dwelling invertebrates - notably very toxic group of plants and

Animals have been identified as important part of the biosphere, also plays an important part in atmosphere formation

① The atmosphere - the atmosphere is the gaseous envelop surrounding a planet. On earth it is also called air. The lower regions of the atmosphere contain gases such as oxygen and carbon dioxide that are essential for plant and animals respiration. Birds, insects and other life can be found up to approximately 2000 metres above the earth's surface. The atmosphere also plays critical roles in shaping the biosphere by deflecting harmful radiation from the sun and determining weather patterns.

Importance of Biosphere

Biosphere is important for living organisms because it is termed as the zone of life on earth. And because it is ecological system of earth.

The biosphere can also be referred to the zone of life on earth.

Without the biosphere, life on earth as we know it would not exist.
