WHAT IS THE BIOSPHERE?
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The history of a word

Sometimes the history of a word can tell us a lot about what the word means. Often, a closer look at a word unfolds into another story, one that may connect to other people and other scientific studies.

The word biosphere was first used by English-Austrian geologist Eduard Suess (1831 — 1914) more than a hundred years ago in a four-volume work called *The Face of the Earth* (1885 — 1908).

Suess combined bio, meaning “life,” and sphere, referencing the round Earth, to describe the part of the Earth that supported life. He invented the word because he felt it was important to try to understand life as a whole rather than singling out particular organisms. He wrote in *The Face of the Earth*:

> The plant, whose deep roots plunge into the soil to feed, and which at the same time rises into the air to breathe, is a good illustration of organic life in the region of interaction between the upper sphere and the lithosphere, and on the surface of continents it is possible to single out an independent biosphere.

As we learn more about the planet, we’ve come to use the word biosphere as a way of explaining the entire interconnected network of life on Earth. This concept combines an understanding of geology, knowledge of the different layers that make up the Earth and its atmosphere, and an awareness of the biodiversity surrounding us. We can think of the biosphere as the habitat, or home, for all life on our planet, in all its forms, and with all its intricate biological and geological relationships.

**Biosphere = the network of all life on Earth**
The biosphere comfort zone is the layer of the Earth that is most habitable for most birds, which fly within 2 km of the ground. Most life on Earth lives in a thin layer on, near, or under the surface. The highest peak, Mount Everest, is 8,848 meters (29,029 feet) above sea level, located on the Nepal-Tibet border. Everest is one of many peaks taller than 8,000 meters in the massive Himalayan range. The Himalayas were formed 40–50 million years ago when the Indian plate collided with the Eurasian plate. The intense cold at this altitude makes for a rough habitat, but birds have been seen flying over Everest and some even nest on its lower slopes.

Challenger Deep is at least 10,902 meters (35,768 feet) below sea level, the deepest depression in the western Pacific's Mariana Trench. The trench, near Guam, was formed when the Pacific plate was subducted beneath the smaller Mariana plate. The pressure this deep in the ocean is more than a thousand times that at sea level, but some organisms thrive in these extreme conditions.
Worlds within worlds

The biosphere is incredibly small. It’s just a thin layer around a mediumsized planet. But it’s also incredibly large when you consider all the different living things and our planet’s vast areas of water and land. As with most things that seem very large, it’s possible to break down the biosphere and use other words to describe specific environments or habitats.

These smaller areas are called “ecosystems.” An ecosystem is a unique area that supports certain forms of life. Oceans, jungles, and mountain ranges can be ecosystems, but even more specific places can be their own ecosystems. Think of a cave, a river or river valley, a coral reef, a city, or the “vent communities” that surround hydrothermal vents on the ocean floor.

Altitude, latitude, longitude, climate, soils, and terrain can all contribute to the distinct features of an ecosystem. The Earth’s geologic processes have produced many diverse environments. The biosphere boasts incredible diversity and, even in extreme environmental conditions, astounding examples of life’s flexibility and determination.

Every organism has a specialized way to make a living. Baboons and bacteria both fight for resources and energy in their own way. They all reproduce within their own environment. Examining these individual ecosystems, using biology and geology, reveals the many complex relationships between life and the planet we all share.