3-1 What Is Ecology?

Interactions and Interdependence

Ecology is the scientific study of interactions among organisms and between organisms and their environment, or surroundings.

The **biosphere** contains the combined portions of the planet in which all of life exists, including:

- land
- water
- air, or atmosphere

The biosphere extends from about 8 kilometers above Earth's surface to as far as 11 kilometers below the surface of the ocean.

Interactions within the biosphere produce a web of interdependence between organisms and the environment in which they live.

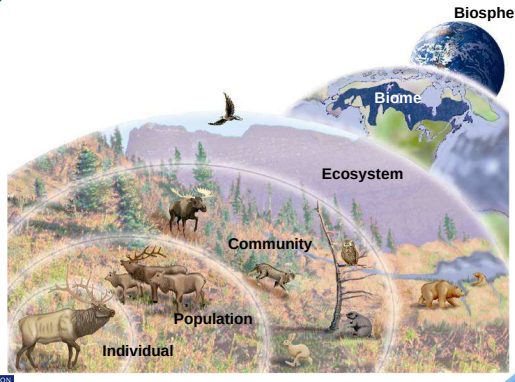
The interdependence of life on Earth contributes to an ever-changing, or dynamic, biosphere.

What different levels of organization do ecologists study?

Levels of Organization

To understand relationships within the biosphere, ecologists ask questions about events and organisms that range in complexity from a single individual to the entire biosphere.

The levels of organization that ecologists study include: individuals, populations, communities, ecosystems, and biomes.



A **species** is a group of organisms so similar to one another that they can breed AND produce fertile offspring.

Populations are groups of individuals that belong to the same species and live in the same area.

Communities are assemblages of different populations that live together in same area.

An **ecosystem** is a collection of all the organisms that live in a particular place, together with their nonliving (physical) environment.

A **biome** is a group of ecosystems that have the same climate and similar dominant communities.

The highest level of organization that ecologists study is the entire **biosphere** itself.

What methods are used to study ecology?

Ecological Methods

Regardless of the tools they use, scientists conduct modern ecological research using three basic approaches:

- **observing**
- **experimenting**
- **modeling**

All of these approaches rely on the application of scientific methods to guide ecological inquiry.

Observing

Observing is often the first step in asking ecological questions.

Some observations are simple. Others are complex and may form the first step in designing experiments and models.

Experimenting

Experiments can be used to test hypotheses.

An ecologist may set up an artificial environment in a laboratory to imitate and manipulate conditions that organisms would encounter in the wild.

Other experiments are conducted within natural ecosystems.

Modeling

Ecologists make models to gain insight into complex phenomena.

Many ecological models consist of mathematical formulas based on data collected through observation and experimentation.

The predictions made by ecological models are often tested by further observations and experiments.