EWCE 131

Ecology and Environmental Pollution

Lecture 1

Instructor

Maj Dr. Kazi Shamima Akter, Engrs

Department of EWCE, MIST

Lecture outline

Ecology and Ecosystem

Topics

- **Basic concept on ecology, Scope and importance of ecology**
- **Ecological levels of organization hierarchy**

Ecology

- The scientific study of living organisms in the natural environment
- How they interact with one another
- How they interact with their nonliving environment
- Ecology is a science of relationships

Environment

The environment is made up of two factors:

- Biotic factors- all living organisms inhabiting the Earth
- Abiotic factors- nonliving parts of the environment (i.e. temperature, soil, light, moisture, air currents)



Importance of Ecology

- Understanding the scientific basis for interdependence & connectedness is essential for -

- solving environmental problems &

- ensuring sustainability of a high–quality life for humans & other organisms.

Scope of Ecology

- Ecology explores a wide range of questions about what factors control the distribution, abundance and behavior of organisms.

- For example, Red Kangaroos occur primarily in the Australian interior, in semiarid regions.

Scope of Ecology

- Distribution of Kangaroos suggests an abiotic factor (precipitation) influences it, but perhaps populations also influenced indirectly by biotic factors such as competitors, predators, food availability and parasites.

- Ecologists have to consider multiple factors to explain patterns of abundance and distribution.

Scope of Ecology



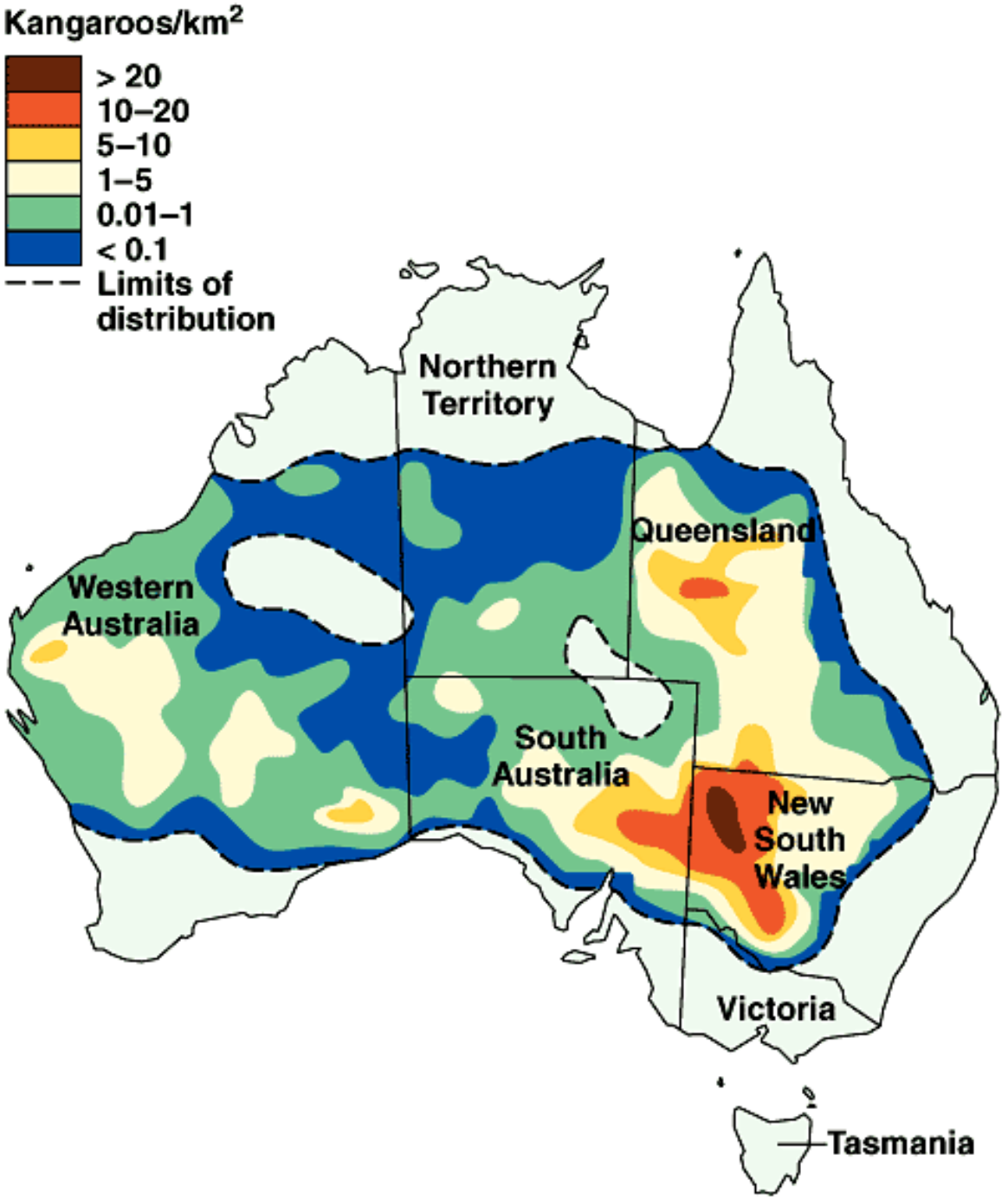
Red Kangaroo



Grey Kangaroo

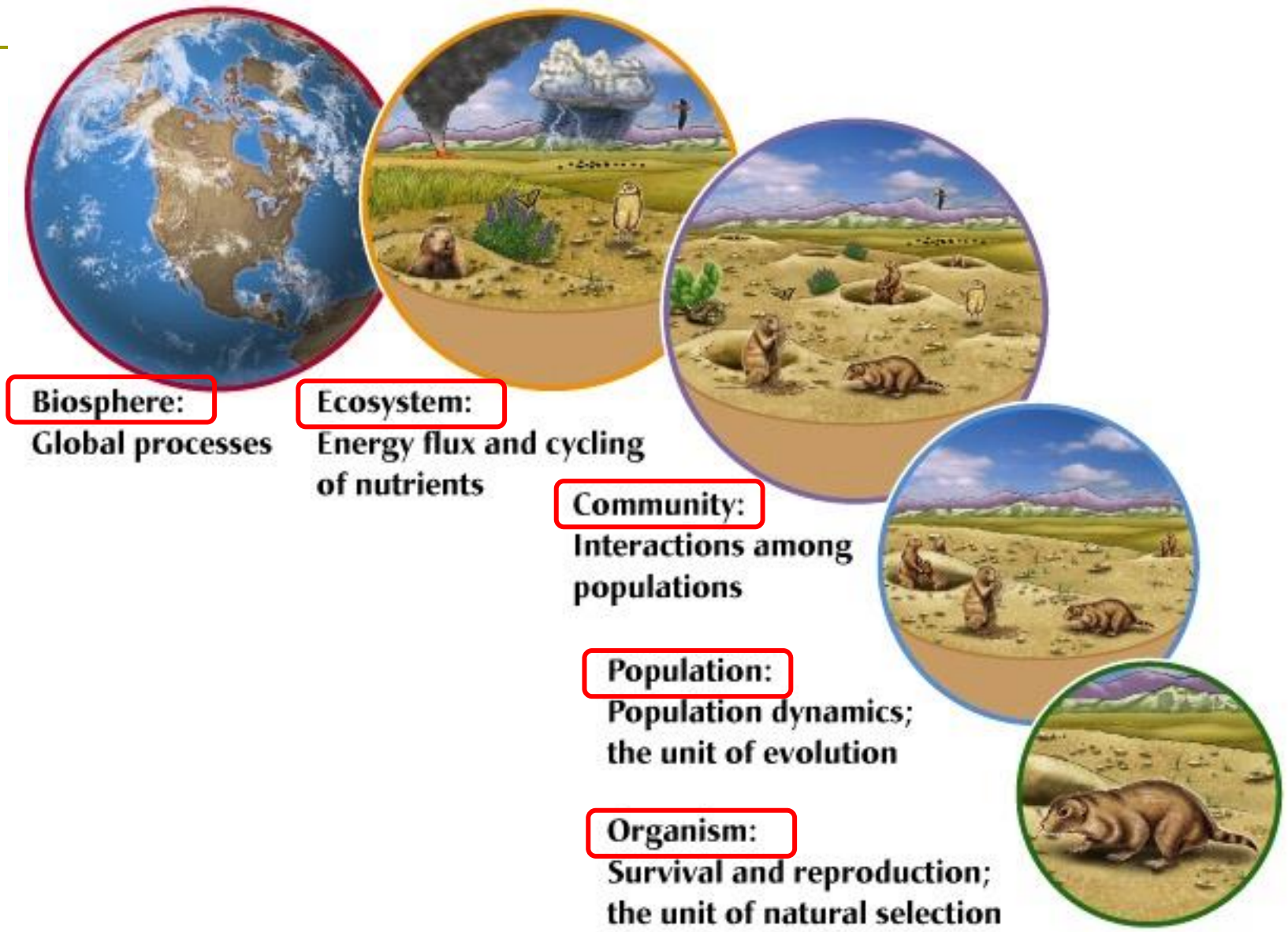


Antilopine Kangaroo



Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

Ecological Level of Organization



Ecological Level of Organization - Organisms

- any unicellular or multicellular form exhibiting all of the characteristics of life, an individual.
- The lowest level of organization





Ecological Level of Organization - Organisms

- Organisms are classified into species.
- **Species**: groups of organisms that resemble each other, can potentially interbreed.
- **Wild or native species**: population that exists in its natural habitat.
- **Domesticated or introduced species**: population introduced by humans (= non–native species).

Ecological Level of Organization- Population

A group of organisms of one species living in the same place at the same time that interbreed



- Produce fertile offspring
- Compete with each other for resources (food, mates, shelter, etc.)

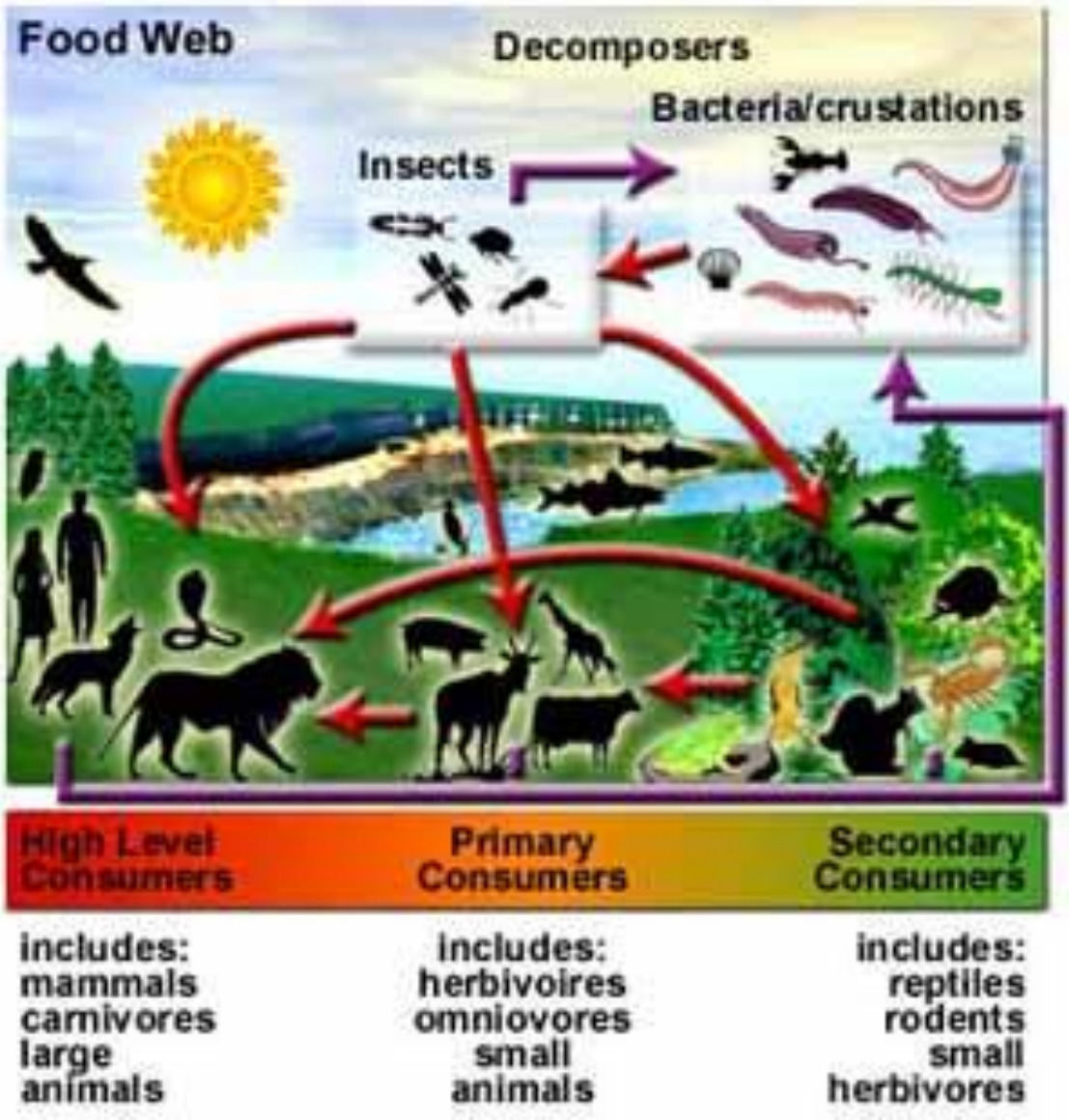
Ecological Level of Organization- Population

- Examples: sunfish in a pond, white oak trees in a forest, people in a city.
- **Habitat**: The place where a population usually lives.
- **Genetic diversity**: In natural populations, individuals vary in their genetic makeup. Exp: blue eyes vs. green eyes



Ecological Level of Organization - Community

- Several interacting populations in a given area
- Inhabit a common environment
- Interdependent.



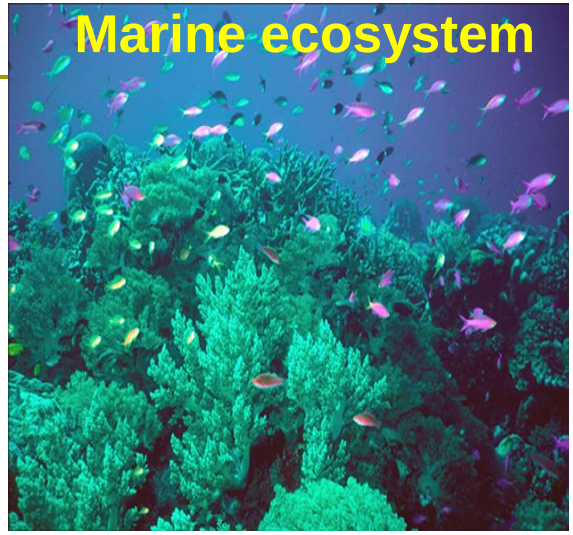
Ecological Level of Organization - Community

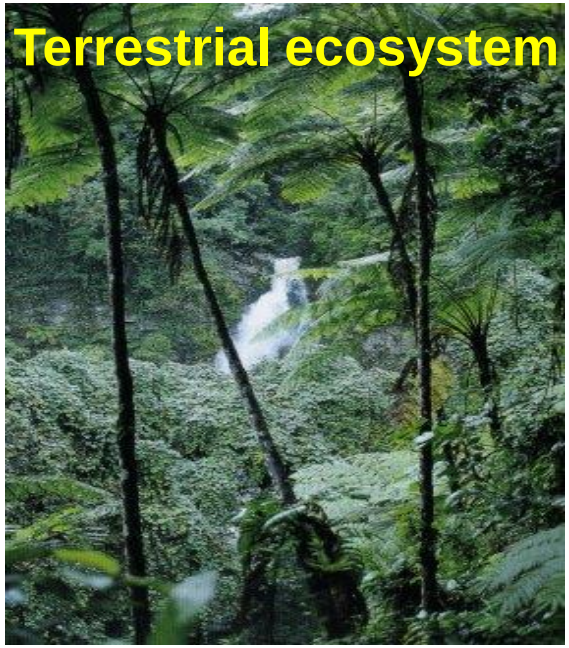
- A biological community is a complex interacting network of plants, animals and microorganisms.

- Example: redwood forest community, consisting of populations of redwoods & other trees, shrubs and herbaceous species, animals and microorganisms.

Ecological Level of Organization - Ecosystem

- Populations in a community and the abiotic factors with which they interact
- Exp: marine, terrestrial
- Ducks, fish, and insect larvae living in/on a lake or pond.





Ecological Level of Organization - **Biosphere**

- Life supporting portions of Earth composed of air, land, fresh water, and salt water.

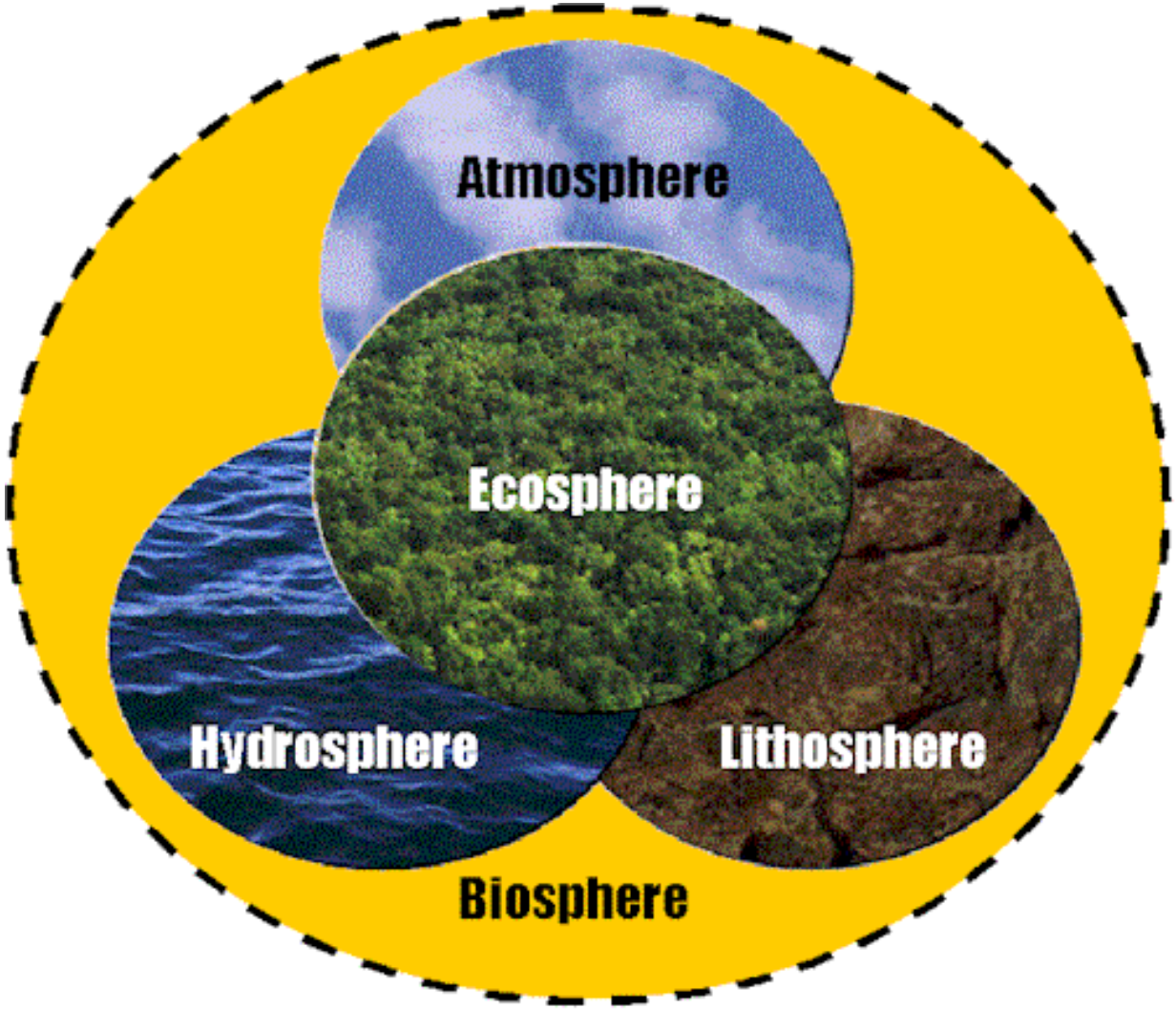
- The highest level of organization



Ecological Level of Organization - Biosphere

- The biosphere is composed of numerous complex ecosystems.
- An ecosystem involves interactions between abiotic (physical) and biotic (living) factors.
- The members of the community in the ecosystem and environment must interact to maintain a balance.

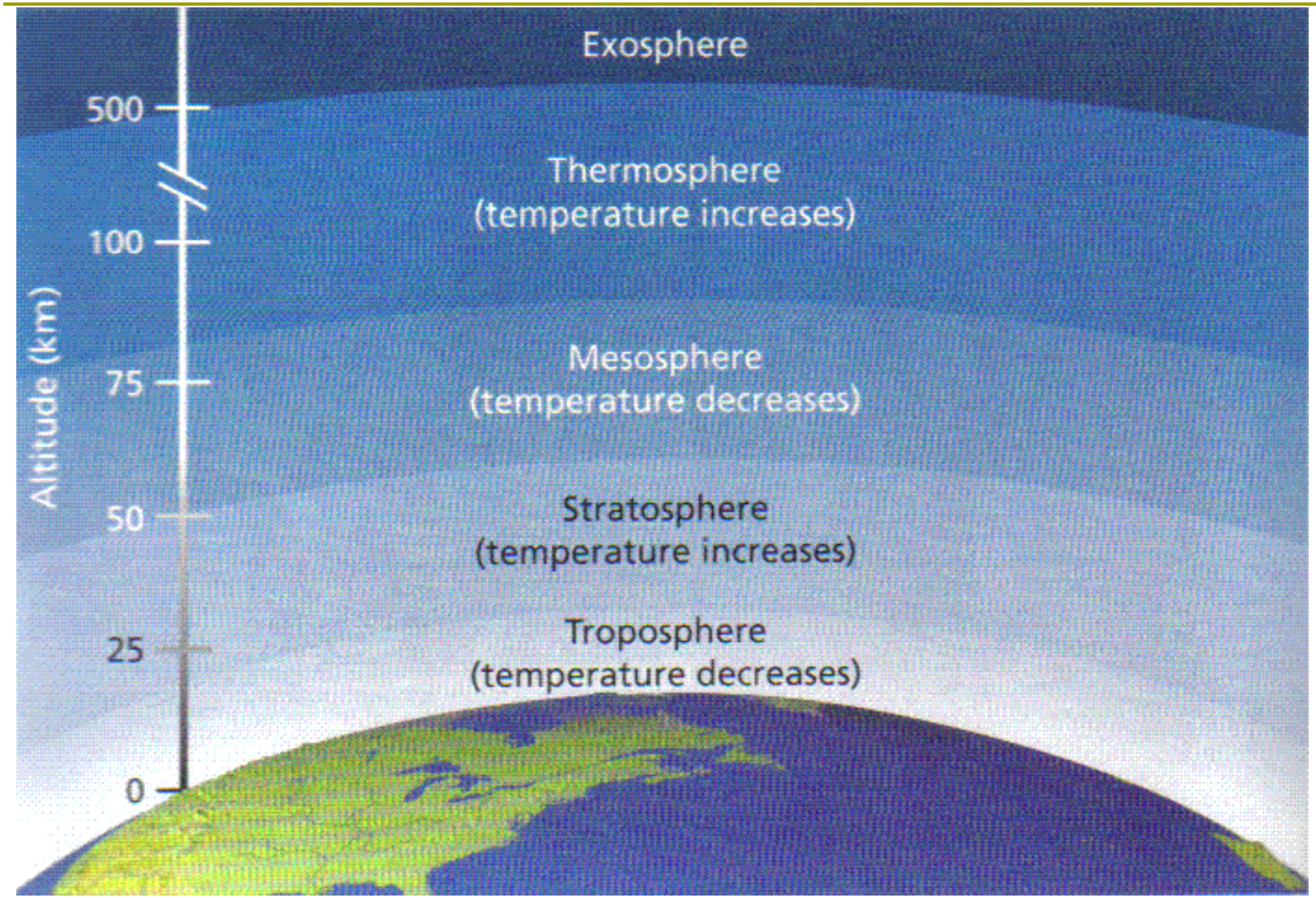
Ecological Level of Organization



Life Support System - Layers of Earth

- *Atmosphere* - thin layer of gases (N_2, O_2, CO_2, Ne, Ar etc) held close to the earth's surface.
  - *Troposphere* - atmosphere's inner layer.
    - Nitrogen & Oxygen found here.
    - All weather occurs here.
    - Contains "greenhouse" gases: CO_2 & H_2O
  - *Stratosphere* - layer above troposphere.
    - Contains ozone (O_3) which filters sun's harmful UV.
  - *Mesophere* - above the stratosphere
    - area where meteors burn up.
  - *Thermosphere (ionosphere)* - thinnest gas layer,
    - aurora's take place and space shuttle orbits

Layers of Earth - Atmosphere



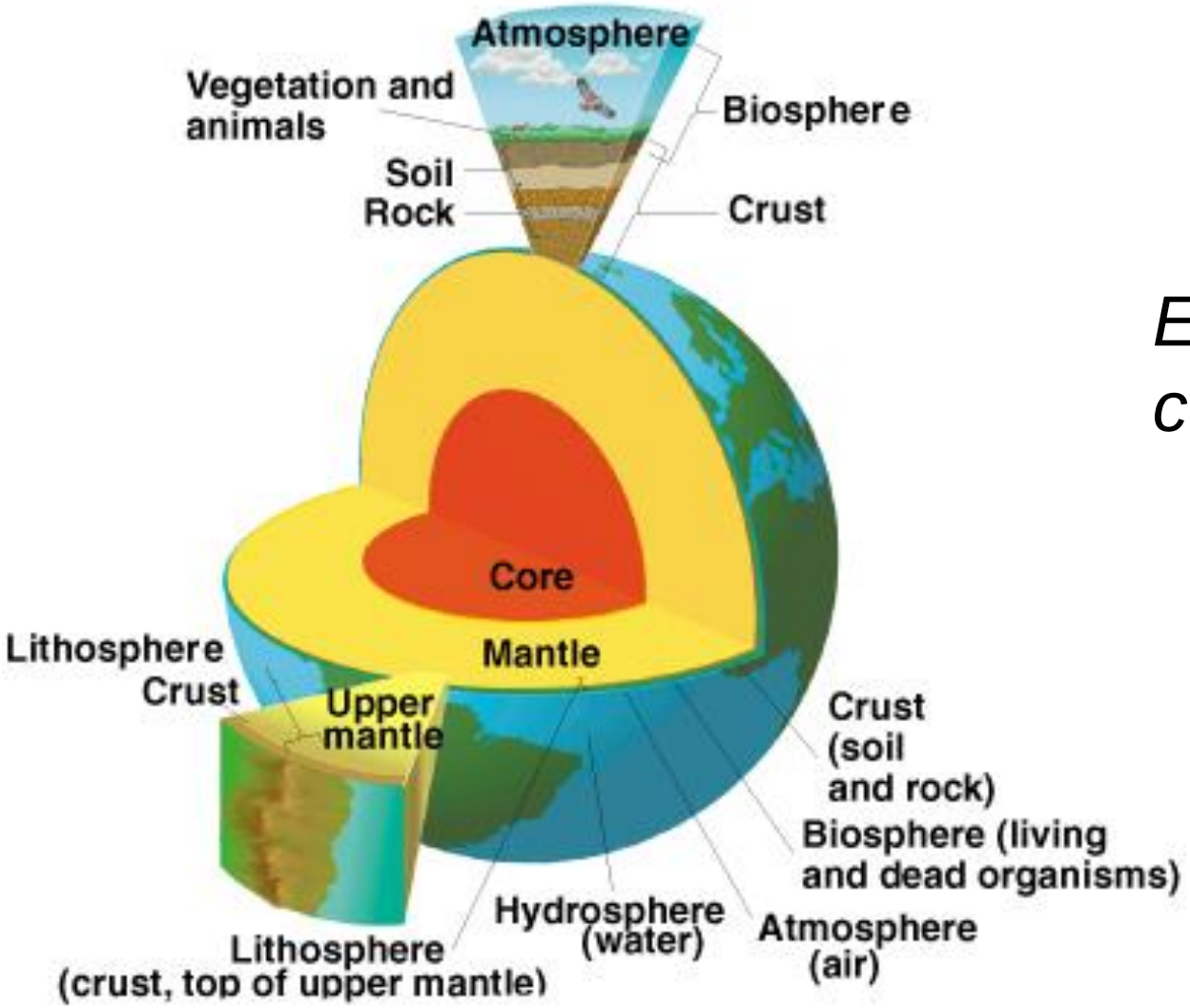
Layers of Earth

- **Hydrosphere** - Water layer. Liquid, Ice, Vapor.

- **Lithosphere** - Earth's crust and upper mantle.
  - Fossil fuels, minerals, soil chemicals.

- **Biosphere** - Biotic and abiotic factors.

Earth's Life Support System



Earth's major components