

Readings : Chapter 03 in textbook

Use these objectives in addition to the Review Questions on page 77-79 of your textbook.

01 Be able to define **ecology**. Be prepared to list and to distinguish among five levels of organization of matter that are the focus of the realm of ecology.

02 Be able to distinguish among **lithosphere**, **hydrosphere**, **atmosphere**, and **ecosphere**. Be prepared to provide a brief explanation of how the sun, gravity, and nutrient cycles sustain life on Earth. Be ready to compare the **fate of matter** with the **fate of energy** as they move through the **biosphere**.

03 Be able to distinguish between an **open system** and a **closed system**. (with respect to matter or to energy). Be prepared to list and describe the three main types of **biogeochemical cycle**.

04 Be able to define **abiotic** component of an ecosystem. Be able to list three important **physical factors** and three important **chemical factors** that have large effects on ecosystems.

05 Be prepared to summarize the **Law of Tolerance**. Be able to compare **limiting factors** in terrestrial and aquatic ecosystems.

06 Be able to define **biotic** component of an ecosystem. Be prepared to distinguish between **producers (autotrophs)** and **consumers (heterotrophs)**. Be ready to list and distinguish four types of consumers.

07 Be able to distinguish between (among)  
**scavengers**, **detritus feeders (detritivores)** and **decomposers**  
**photosynthesizers** and **chemosynthesizers**  
**aerobic respiration** and **anaerobic respiration**

08 Be able to distinguish between **food chains** and **food webs**. Be prepared to apply the Second Law of Thermodynamics to food chains and pyramids of energy, which describe energy flow in ecosystems. Be ready to explain how there may be exceptions to **pyramids of numbers** and **pyramids of biomass**, but not **pyramids of energy**.

09 Be able to define **ecosystem service**. Be prepared to list five examples of ecosystem services. Be ready to distinguish among three types of **biodiversity**. Be prepared to state two principles to sustain ecosystems.

10 Be prepared to diagram the **hydrologic cycle** and to explain the inputs and outputs which regulate the cycle. Be ready to discuss the many ways humankind interferes with the hydrologic cycle (and the implications of such interference for the environment).

11 Be prepared to diagram the **carbon cycle** and / or the **nitrogen cycle** and to explain the inputs and outputs which regulate these cycles. Be ready to discuss the many ways humankind interferes with these cycles (and the implications of such interference for the environment).

12 Be prepared to diagram the **phosphorus cycle** and / or **sulfur cycle** and to explain the inputs and outputs which regulate these cycles. Be ready to discuss the many ways humankind interferes with these cycles (and the implications of such interference for the environment).

13 Be prepared to explain the role of nitrogen and / or phosphorus in **cultural eutrophication**. Be prepared to define cultural eutrophication and explain its multiple impacts on domestic water treatment. Be ready to explain how (in very specific terms) the human species interferes with biogeochemical cycling.

For those interested in learning more:

- a) Be prepared to distinguish between **grazing food webs** and **detrital food webs**.
- b) Be able to evaluate which ecosystems show the highest average **net primary productivity** and which contribute most to global net primary productivity. Be prepared to explain any apparent discrepancies.