

Chapter 3—Ecosystem Ecology

Monday	Tuesday	Wednesday	Thursday	Friday
		17 Module 6—The Movement of Energy	18 Ecosystem Field Walk	19 Module 7—The Movement of Matter
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Reading Questions

- Why is it difficult to determine what the boundaries to an ecosystem are? Contrast the examples of a cave versus a forest or desert.
- How does most energy enter ecosystems? What types of energy conversion occur within ecosystems?
- How are trophic levels related to flow of energy through an ecosystem? What form is this energy in?
- What does the productivity of an ecosystem measure?
 - What is the difference between Gross Primary Productivity and Net Primary Productivity? Which one do you think has more of an influence on an ecosystem?
 - Approximately what percentage of incoming solar energy do plants capture during photosynthesis? What happens to the rest of it?
- Why is only a small fraction of energy at each trophic level transferred up to the next trophic level? Where does the rest of the energy go?

6. Hydrologic Cycle

Name of Step	What process makes this happen?	Why is this step important?
Evaporation	Solar heating of oceans, lakes, soils	Water enters atmosphere to be redistributed

Explain how the hydrologic cycle works:

7. Carbon Cycle

Name of Step w/ description of change	What organism/process does it?	Why is this step important?
Photosynthesis ($\text{CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$)	Autotrophs (plants) (producers)	Converts abiotic CO_2 to biomass (base of food chain)

Explain how the carbon cycle works:

8. Nitrogen Cycle

Name of Step w/ chemical change	What organism/process does it?	Why is this step important?
Nitrogen Fixation ($\text{N}_2 \rightarrow \text{NH}_3$ or NO_3)	N-fixing bacteria (ie in legume roots) OR fires/lightning OR fertilizer manufacturing	Puts N in to the base of the food chain; fertilizer manufacture

Explain how the nitrogen cycle works:

10. Phosphorus Cycle

Name of Step w/ description of change	What process/organism does it?	Why is this step important?
Weathering of rock → Phosphate PO ₄	Weathering (by rain, wind, ice, organisms)	Releases P from rocks in to reactive form usable by organisms

Explain how the phosphorus cycle works:

11. How does the water cycle help facilitate the other cycles?

12. What human activities cause an impact on the hydrologic cycle? What are these impacts?

13. Explain the difference between the “fast” and “slow” parts of the carbon cycle.

Fast:

Slow:

14. Which natural (nonanthropogenic) processes normally return buried carbon to the atmosphere to balance out the carbon that is buried through sedimentation?

15. Which 2 macronutrients most frequently serve as the limiting nutrient for plant growth in an ecosystem? Is it different for terrestrial vs. aquatic ecosystems?

16. What are the results of a sudden influx of excess nitrogen or phosphorus in to an ecosystem?

N –

P –

17. How do heterotrophs (consumers) obtain their supplies of macronutrients?

18. When investigating environmental systems, why do scientists often select watersheds as an area in which to study ecosystems and nutrient/energy cycling?
19. What characteristics do you think give ecosystems high resistance and high resiliency against change?
20. Describe each of the major types of ecosystem services, and how their value can be measured:

Chapter 3 Vocabulary List

Ecosystem	
Producers (Autotrophs)	
Photosynthesis	
Cellular Respiration	
Consumers (Heterotrophs)	
Primary Consumers	
Secondary Consumers	
Tertiary Consumers	
Trophic Levels	
Food Chain	
Food Web	
Scavengers	
Detritivores	
Decomposers	
Gross Primary Productivity (GPP)	
Net Primary Productivity (NPP)	
Biomass	
Standing Crop	

Ecological Efficiency	
Trophic Pyramid	
Biosphere	
Biogeochemical Cycles	
Hydrologic Cycle	
Transpiration	
Evapotranspiration	
Runoff	
Macronutrients	
Limiting Nutrient	
Nitrogen Fixation	
Leaching	
Disturbance	
Watershed	
Resistance	
Resilience	
Restoration Ecology	
Intermediate Disturbance Hypothesis	
Instrumental Value	
Intrinsic Value	
Provisions	