

Ecosystem Ecology

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Contents

Section 1: Energy Powers Ecosystems

Energy flows while materials cycle. Net primary production is the difference between gross primary production and respiration. Ecological Footprint is defined.

- Energy Flows and Nutrients Cycle
- Chopping Wood
- What Are Ecosystems?
- Photosynthesis Powers Most Ecosystems
- Reap What You Sow
- Ecological Footprint
- Section Summary
- Ask Your Instructor

Section 2: Primary Production and Respiration

Primary production and respiration are intimately linked and can be estimated by changes in biomass, carbon dioxide, or oxygen. Primary production is spatially variable. Limits to primary production for terrestrial and aquatic ecosystems are explored.

- Better Biofuels: A Primary Production Problem
- Measuring Net Primary Production
- Photosynthesis and Respiration
- How Do Ecologists Estimate GPP?
- Primary Production in Lakes and Oceans
- What Limits Aquatic Primary Production?
- What Limits Terrestrial Primary Production?
- Global Patterns of Terrestrial Primary Production
- Biofuels Revisited
- Section Summary
- Ask Your Instructor

Section 3: Secondary Production

Secondary production is fueled by primary production. Energy flow through ecosystems is constrained by the laws of thermodynamics, which explain why energy transfers are inefficient and predators are rare.

- Primary Production Fuels Secondary Production
- Countin' Sheep
- Energy Transfers Are Inefficient
- You Are What You Eat
- Ecological Efficiencies of Herbivores Vary
- The Cost of Thermoregulation
- Energy Availability Declines Along Food Chains
- Section Summary
- Ask Your Instructor

Section 4: Ecosystem Energetics

Consumption efficiencies determine energy flows through grazer food chains. Heterotrophic and autotrophic ecosystems are explained. Eltonian pyramids characterize ecosystems. Energy flows differently through aquatic and terrestrial systems. Residence time is defined.

- The Detrital Pathway
- What Determines the Fate of NPP?
- Autotrophic and Heterotrophic Ecosystems
- Eltonian Pyramids
- Residence Times Vary
- Section Summary
- Ask Your Instructor

Section 5: Ecosystem Services

Ecological Footprint varies by country/region and over time. Ecosystem services are critical, but their values are difficult to assess. Humans appropriate a large fraction of primary production. "Tragedy of the commons" is defined.

- The Lesson of the Cod Wars
- Our Growing Footprint
- Ecosystem Services
- Ecosystem Services Rely on NPP
- Service Valuation Is Difficult But Possible
- Tragedy of the Commons
- Section Summary
- Ask Your Instructor