

# Physiological Ecology

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## Contents

### Section 1: Climate, Biomes, and Species Distributions

Explore global distributions of biomes and the importance of temperature and precipitation (Whittaker's diagram). Understand potential and actual evapotranspiration, how to interpret climate diagrams, resource limitation and Liebig's law of the minimum.

- The Fundamental Tasks of Living
- Do Species Distributions Form Patterns?
- Whittaker's Diagram: Biomes
- Temperature Drives Evaporation
- Potential and Actual Evapotranspiration
- Climate Diagrams
- Tolerances Define Species Ranges
- Beyond Water and Temperature
- Section Summary
- Ask Your Instructor

### Section 2: Acclimation and Adaptation

Organisms may respond to environmental change by physiological acclimation or by adaptation, both of which can affect population viability and range shifting. Simulate acclimating and evolving trout, and practice distinguishing between the two processes.

- How Organisms Respond to Environmental Change
- Acclimation vs. Adaptation
- Enzyme Activity Curves
- Acclimation: How Does It Work?
- Adaptation Through Evolution
- Managing Large Dams for Conservation
- Species' Ranges Are Affected by Acclimation and Adaptation
- Irreversible Acclimation
- Distinguishing Between Acclimation and Adaptation
- Section Summary
- Ask Your Instructor

### Section 3: Homeostasis

Explore how organisms achieve homeostasis using the examples of water and heat budgets for interactive kangaroo rats. Investigate other examples of physiological adaptations that help organisms maintain homeostasis.

- Facing a Basic Challenge
- Water Balance
- Budgets Highlight How Homeostasis is Maintained
- Temperature Regulation
- Heat Budget for a Homeothermic K-rat
- Full Heat Budget: Inputs Minus Outputs
- Section Summary
- Ask Your Instructor

#### **Section 4: Plant Metabolism**

Understand the multi-faceted role of water and transpiration for photosynthesis in plants, and investigate factors affecting transpiration. Discover and compare three different photosynthetic pathways, and learn how they affect plant species distributions.

- The Shortcomings of Tall Trees
- The Currency of Photosynthesis
- Transpiration Drives Water Movement
- Cavitation
- Reducing Cavitation Risk
- C 3 Photosynthesis and Photorespiration
- C 4 Photosynthesis
- CAM Photosynthesis
- Photosynthetic Pathways Explain Plant Distributions
- Section Summary
- Ask Your Instructor