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SimUText Ecology® — Interactive Chapters

SimUText Ecology chapters cover the same breadth as traditional textbook chapters but are interactive, integrating short simulated experiments, animations and "test-your-understanding" questions with text. The self-check questions and auto-graded end-of-section quizzes reinforce understanding and offer instructors useful insight into student perceptions and misconceptions. The interactive chapters were designed to replace all or parts of the most popular General Ecology textbooks. Your SimUText can also include SimBio Virtual Labs.

POPULATION ECOLOGY

Population Growth explores population dynamics and population growth models using a weed species, a crop pest, and an endangered salamander as model organisms. Simulations help clarify topics, which include density-dependent and density-independent factors, meta-population dynamics, and factors generating variability.

Life History introduces fundamental life history trade-offs, setting the stage for students to explore demography, life tables, survivorship curves, and strategies of allocation. Simulated experiments involve several interesting model organisms, including humans!

ORGANISMAL ECOLOGY

Behavioral Ecology examines the adaptive value of a wide variety of behaviors and presents a range of models that lend insight into how these behaviors evolved. Topics include optimal foraging, game theory, sexual selection and sexual conflict, cooperation and the "problem with altruism".

Physiological Ecology explores aspects of physiology that impact ecology, focusing on temperature and water and how these factors affect plant communities around the globe. Includes sections on the heat and water balance equations, adaptation vs. acclimation, different types of photosynthesis, water balance, and heterotrophic ingestion.

ORGANISMAL ECOLOGY, CONT...

Biogeography explores how large-scale and global patterns of biodiversity relate to landscapes, emphasizing conservation applications. Topics covered include air and water circulation, biomes, measures of diversity, species-area curves and island biogeography, paleoecology and geologic-time impacts on diversity.

Evolution for Ecology This popular chapter explores evolutionary mechanisms (natural selection, genetic drift, migration, and mutation) from an ecological perspective. Interactive exercises and examples include investigations of stickleback evolution and the evolution of resistance to pesticides and antibiotics.

SPECIES INTERACTIONS

Competition covers intraspecific and interspecific competition, including niches, logistic growth, Lotka-Volterra equations, and isoclines. Powerful interactives, such as manipulable phase plane plots of the Lotka-Volterra competition equations, let students dynamically explore important quantitative models.

Predation, Herbivory and Parasitism introduces exploitative interactions between species. Includes classifications of each type of interaction and prey responses to exploitation, Lotka-Volterra predation equations, functional responses, and an exploration of the Red Queen hypothesis.

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SIMUTEXT ECOLOGY MODULES, CONTINUED...

ECOSYSTEM ECOLOGY

Ecosystem Ecology our growing ecological footprint and reliance on ecosystem services provide context to explore and learn about the flow of energy through ecosystems, primary production and respiration, secondary production, consumer and detrital food chains, transfer efficiencies, and energy flow diagrams.

Nutrient Cycling This important chapter, updated for 2020, examines biogeochemical cycles across scales. Engaging interactive diagrams and simulations elucidate key concepts such as flux-and-pool models, cycles for essential macronutrients, and nutrient pollution. With guidance, students interpret global human impacts on nutrient cycles and learn how scientists use nutrient budgets to solve real-world nutrient mitigation challenges.

Decomposition - Updated for Summer 2021 Updated in 2021, this chapter explores how life after death impacts ecological systems, using LTER network data, interactive forensic science and climate change simulations, and other inquiry-driven activities. Investigating the "decomposition triangle", students discover how decomposer organisms, litter quality, and the physical environment affect decomposition rates.

COMMUNITY ECOLOGY

Community Dynamics uses simulated case studies from Yellowstone National Park to explore succession and disturbance, food chains and food webs, trophic cascades, top-down vs. bottom-up effects, community stability, ecosystem engineers, and keystone and dominant species.

APPLIED ECOLOGY

Climate Change builds an understanding of the scientific evidence that climate is changing and elucidates the physics underlying global temperatures, the evidence for human impact on climate, and how changing temperatures affect ecological systems.

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