

## Chapter 4 Ecosystems Communities Test B Answer Key

A Special Publication of the Society of Environmental Toxicology and Chemistry (SETAC) Aquatic Mesocosm Studies in Ecological Risk Assessment discusses the methods currently used for conducting simulated field studies and provides a series of case histories in which mesocosm type studies have been used to assess the impact of pesticides on aquatic ecosystems. Specific chapters address the dosing and exposure components of such studies and how they influence experimental design. Advantages and disadvantages of various statistical designs are addressed in detail. Regulatory aspects of the design and interpretation of these studies are also covered. The book will be a superb reference for aquatic biologists, ecologists, toxicologists, environmental toxicologists, environmental chemists, and regulatory personnel.

Most climate change predictions focus on the response of individual species to changing local conditions and ignore species interactions, largely due to the lack of a sound theoretical foundation for how interactions are expected to change with climate and how to incorporate them into climate change models. Much of the variability in species interaction strengths may be governed by fundamental constraints on physiological rates, possibly providing a framework for including species interactions into climate change models. Metabolic rates, ingestion rates and many other physiological rates are relatively predictable from body size and body temperature due to constraints imposed by the physical and chemical laws that govern fluid dynamics and the kinetics of biochemical reaction times. My dissertation assesses the usefulness of this framework by exploring the community-level consequences of physiological constraints. In Chapter 2, I incorporated temperature and body size scaling into the biological rate parameters of a series of realistically structured trophic network models. The relative magnitude of the temperature scaling parameters affecting consumer energetic costs (metabolic rates) and energetic gains (ingestion rates) determined how consumer energetic efficiency changed with temperature. I systematically changed consumer energetic efficiency and examined the sensitivity of network stability and species persistence to various temperatures. I found that a species' probability of extinction depended primarily on the effects of organismal physiology (body size and energetic efficiency with respect to temperature) and secondarily on the effects of local food web structure (trophic level and consumer generality). This suggests that physiology is highly influential on the structure and dynamics of ecological communities. If consumer energetic efficiency declined as temperature increased, that is, species did best at lower temperatures, then the simulated networks had greater stability at lower temperatures. The opposite scenario resulted in greater stability at higher temperatures. Thus, much of the community-level response depends on what species energetic efficiencies at the organismal-level really are, which formed the research question for Chapter 3: How does consumer energetic efficiency change with temperature? Existing evidence is scarce but suggestive of decreasing consumer energetic efficiency with increasing temperature. I tested this hypothesis on seven rocky intertidal invertebrate species by measuring the relative temperature scaling of their metabolic and ingestion rates as well as consumer interaction strength under lab conditions. Energetic efficiencies of these rocky intertidal invertebrates declined and species interaction strengths tended to increase with temperature. Thus, in the rocky intertidal, the mechanistic effect of temperature would be to lower community stability at higher temperatures. Chapter 4 tests if the mechanistic effects of temperature on ingestion rates and species interaction strengths seen in the lab are apparent under field conditions. Bruce Menge and I related bio-mimetic estimates of body temperatures to estimates of per capita mussel ingestion rates and species interaction strengths by the ochre sea star *Pisaster ochraceus*, a

keystone predator of the rocky intertidal. We found a strong, positive effect of body temperature on both per capita ingestion rates and interaction strengths. However, the effects of season and the unique way in which *P. ochraceus* regulates body temperatures were also apparent, leaving room for adaptation and acclimation to partially compensate for the mechanistic constraint of body temperature. Community structure of the rocky intertidal is associated with environmental forcing due to upwelling, which delivers cold, nutrient rich water to the nearshore environment. As upwelling is driven by large-scale atmospheric pressure gradients, climate change has the potential to affect a wide range of significant ecological processes through changes in water temperature. In Chapter 5, my coauthors and I identified long-term trends in the phenology of upwelling events that are consistent with climate change predictions: upwelling events are becoming stronger and longer. As expected, longer upwelling events were related to lower average water temperatures in the rocky intertidal. Furthermore, recruitment rates of barnacles and mussels were associated with the phenology of upwelling events. Thus climate change is altering the mode and the tempo of environmental forcing in nearshore ecosystems, with ramifications for community structure and function. Ongoing, long-term changes in environmental forcing in rocky intertidal ecosystems provide an opportunity to understand how temperature shapes community structure and the ramifications of climate change. My dissertation research demonstrates that the effect of temperature on organismal performance is an important force structuring ecological communities and has potential as a tractable framework for predicting the community level effects of climate change.

Determining the scientific relationship between biodiversity and ecosystem functioning has now emerged as one of the most important challenges in ecological and environmental science. This book provides a timely synthesis and critical assessment in order to generate a consensus on the main issues involved and stimulate new perspectives for future research.

A wide-ranging compilation of techniques, *Extrapolation Practice for Ecotoxicological Effect Characterization of Chemicals* describes methods of extrapolation in the framework of ecological risk assessment. The book, informally known as EXPECT, identifies data needs and situations where these extrapolations can be most usefully applied, makin

Two pioneering anthropologists reveal how complexity science can help us better understand how societies change over time Over the past two decades, anthropologist J. Stephen Lansing and geneticist Murray Cox have explored dozens of villages on the islands of the Malay Archipelago, combining ethnographic research with research into genetic and linguistic markers to shed light on how these societies change over time. *Islands of Order* draws on their pioneering fieldwork to show how the science of complexity can be used to better understand unstable dynamics in culture, language, cooperation, and the emergence of hierarchies. Complexity science has opened exciting new vistas in physics and biology, but poses challenges for social scientists. What triggers fundamental, discontinuous social change? And what brings stable patterns—*islands of order*—into existence? Lansing and Cox begin with an incisive and accessible introduction to models of change, from simple random drift to coupled interactions, phase transitions, co-phylogenies, and adaptive landscapes. Then they take readers on a series of journeys to the islands of the Indo-Pacific to demonstrate how social scientists can harness these powerful tools to discover out-of-equilibrium social dynamics. Lansing and Cox address empirical questions surrounding the colonization of the Pacific, the relationship of language to culture, the emergence and disappearance of male and female hierarchies, and more. *Unlocking new possibilities for the social sciences*, *Islands of Order* is accompanied by an interactive companion website that enables readers to explore the models described in the book.

This text is divided into three parts. The first part describes basic toxicological concepts and methodologies used in aquatic toxicity testing,

including the philosophies underlying testing strategies now required to meet and support regulatory standards. The second part of the book discusses various factors that affect transport, transformation, ultimate distribution, and accumulation of chemicals in the aquatic environment, along with the use of modelling to predict fate.; The final section of the book reviews types of effects or endpoints evaluated in field studies and the use of structure-activity relationships in aquatic toxicology to predict biological activity and physio-chemical properties of a chemical. This section also contains an extensive background of environmental legislation in the USA and within the European Community, and an introduction to hazard/risk assessment with case studies.

Time-variable exposure profiles of pesticides are more often the rule than exception in the surface waters of agricultural landscapes. There is, therefore, a need to adequately address the uncertainties arising from time-variable exposure profiles in the aquatic risk assessment procedure for pesticides. *Linking Aquatic Exposure and Effects: Risk Assessment of Pesticides* provides guidance and recommendations for linking aquatic exposure and ecotoxicological effects in the environmental assessment of agricultural pesticides. Leading international scientists share their expertise in aquatic exposure assessment, aquatic ecotoxicology, and the risk assessment and management of plant protection products. The book incorporates the tools and approaches currently available for assessing the environmental risks of time-variable exposure profiles of pesticides. It also discusses the science behind these techniques. This volume covers the extrapolation techniques, including models that address the environmental fate, toxicokinetics, toxicodynamics, and ecological effects, for performing accurate aquatic environmental risk assessments of pesticides. It explains how to link aquatic exposure and effects in the risk assessment procedure for plant protection products.

The book explores the relationship between biodiversity and ecosystem functional attributes, with the goal of understanding potential conflicts between managing for biodiversity and managing ecosystems. It concludes with innovative approaches that can be developed and incorporated into any framework for ecosystem management.

After fifteen years and three editions, *Introduction to Environmental Toxicology: Molecular Substructures to Ecological Landscapes* has become a standard that defines the field of environmental toxicology, and the fourth edition is no exception. The authors take an integrated approach to environmental toxicology that emphasizes scale and context as important factors in understanding effects and management options. New in the Fourth Edition: New author, Dr. Ruth M. Sofield 8-page color insert New chapter on fate and transport of contaminants Emphasis on the use of all types of models in understanding how nature works Revised sections on synergy and atrazine toxicity Updated coverage of the analysis of impacts to populations, communities and ecosystems Enlarged risk assessment chapter with an in-depth description of a regional scale risk assessment This edition benefits from the insight of a new author, Dr. Ruth M. Sofield, who prepared the new chapter on the fate and transport of contaminants. The relationship between structure and toxicological properties has been a major theme of this book since its inception and this new chapter expands this fundamental concept to include fate and transport. In the early chapters the use of models in science is discussed and this theme carries throughout the rest of the book. So much has changed in the fifteen years since the publication of the first edition. The mid-1990s seem so long ago, when our understanding of environmental toxicology was very basic. Ecological risk assessment was in its very early stages and the consideration of the effects of toxicants on

landscapes was only beginning. Computation was still hard, genes stayed put, and it was only becoming recognized that xenobiotics could have hormonal effects — developments that are taken for granted in this edition. Written by authors who teach this subject, a feature that is reflected in their straightforward style, the book provides a foundation for understanding environmental toxicology and its application.

Functional ecology is the branch of ecology that focuses on various functions that species play in the community or ecosystem in which they occur. This accessible guide offers the main concepts and tools in trait-based ecology, and their tricks, covering different trophic levels and organism types. It is designed for students, researchers and practitioners who wish to get a handy synthesis of existing concepts, tools and trends in trait-based ecology, and wish to apply it to their own field of interest. Where relevant, exercises specifically designed to be run in R are included, along with accompanying on-line resources including solutions for exercises and R functions, and updates reflecting current developments in this fast-changing field. Based on more than a decade of teaching experience, the authors developed and improved the way theoretical aspects and analytical tools of trait-based ecology are introduced and explained to readers.

Progress in Standardization of Aquatic Toxicity Tests provides a critical evaluation of the level of standardization achieved by freshwater and marine ecotoxicity tests used to evaluate potential risk of new chemicals and wastewater effluents. Tests at the sub-cellular, individual, laboratory microcosm, and ecosystem levels are presented and critically evaluated. The influence of environmental and genetic heterogeneity on test standardization is also discussed. The book will be an excellent reference for industry professionals, consultants, regulatory officials, and students working in the ecotoxicology field.

**EVERYTHING YOU NEED TO HELP SCORE A PERFECT 5.** Equip yourself to ace the AP Environmental Science Exam with this comprehensive study guide—including thorough content reviews, targeted strategies for every question type, access to our AP Connect portal online, and 2 full-length practice tests with complete answer explanations. This eBook edition has been optimized for on-screen reading with cross-linked questions, answers, and explanations. Written by the experts at The Princeton Review, *Cracking the AP Environmental Science Exam* arms you to take on the test and achieve your highest possible score. **Techniques That Actually Work.** • Tried-and-true strategies to help you avoid traps and beat the test • Tips for pacing yourself and guessing logically • Essential tactics to help you work smarter, not harder **Everything You Need to Know to Help Achieve a High Score.** • Targeted review of commonly tested lab exercises • Useful lists of key terms for every content review chapter • Engaging activities to help you critically assess your progress • Access to AP Connect, our online portal for helpful pre-college information and exam updates **Practice Your Way to Excellence.** • 2 full-length practice tests with detailed answer explanations and scoring worksheets • Practice drills at the end of each content review chapter • Quick-study “hit parade” of the terms you should know

*Examination of Water for Pollution Control: A Reference Handbook, Volume 3: Biological, Bacteriological and Virological Examination* is a part of a three-volume reference handbook that provides information and recommendations for setting up water pollution control programs and establishing a unified system for the analysis of fresh and waste water. This volume covers

analytical procedures relevant to the examination of water organisms. A concise and systematic description of methods, such as sampling, storage, standardization, operation, and calculation relevant in quantifying variables concerning water organisms, is provided. This book will be of great help to professionals, such as health officials and epidemiologists whose work concerns water sanitation.

Freshwater field tests are an integral part of the process of hazard assessment of pesticides and other chemicals in the environment. This book brings together international experts on microcosms and mesocosms for a critical appraisal of theory and practice on the subject of freshwater field tests for hazard assessment. It is an authoritative and comprehensive summary of knowledge about freshwater field tests, with particular emphasis on their optimization for scientific and regulatory purposes. This valuable reference covers both lotic and lentic outdoor systems and addresses the choice of endpoints and test methodology. Instructive case histories show how to extrapolate test results to the real world.

Handbook of Ecotoxicology, Second Edition focuses on toxic substances and how they affect ecosystems worldwide. It presents methods for quantifying and measuring ecotoxicological effects in the field and in the lab, as well as methods for estimating, predicting, and modeling in ecotoxicology studies. Completely revised and updated with 18 new chapters, this second edition includes contributions from over 75 international experts. Also, a Technical Review Board reviewed all manuscripts for accuracy and currency. This authoritative work is the definitive reference for students, researchers, consultants, and other professionals in the environmental sciences, toxicology, chemistry, biology, and ecology - in academia, industry, and government.

Plant Strategies, Vegetation Processes, and Ecosystem Properties, Second Edition, is a thoroughly updated and comprehensive new edition of the very successful Plant Strategies and Vegetative Processes, which controversially proposed the existence of widely-recurring plant functional types with predictable relationships to vegetation structure and dynamics. This second edition uses evidence from many parts of the world to re-examine these concepts in the light of the enormous expansion in the literature. Features include: \* A new section covering all aspects of ecosystem properties \* New chapters on Assembling of Communities Rarification and Extinction Colonisation and Invasion \* Principles and methodologies of a range of international tests including case study examples \* Chapter summaries for a quick reference guide \* Index of species names Written in a very readable style, this book is an invaluable reference source for researchers in the areas of plant, animal, and community ecology, conservation and land management. 'Written by one of the foremost authorities in the field, summarising over 35 years of research. A book all plant ecologists will want to read.' - Jonathan Silvertown, Department of Biological Sciences, The Open University, UK. 'The coverage is outstanding and comprehensive.' - Simon A. Levin, Department of Ecology and Evolutionary Biology, Princeton University, USA

This report, prepared by the Office of Technology Assessment of the United States Congress, illustrates a range of options for congressional action in three major areas of public policy related to the application of biotechnology: 1) the criteria for review of planned introductions for potential risk, 2) the administrative mechanisms for applying such review criteria, and 3) the research base supporting planned introductions. Commercial biotechnology is advancing into areas that depend on the introduction of genetically engineered organisms into the environment. These applications could improve old tools or produce new ones for many fields, including agriculture, forestry, toxic waste cleanup, mining, enhanced oil and mineral recovery, and others. In some cases, such as best control or toxic waste management, successful

development of biotechnological tools could reduce or phase out dependence on older, more hazardous chemical technologies. It is widely expected that the application of such biological approaches to many human activities will prove more benign to the environment than traditional technologies.

Ecotoxicology is the science that seeks to predict the impacts of chemicals upon ecosystems. This involves describing and predicting ecological changes ensuing from a variety of human activities that involve release of xenobiotic and other chemicals to the environment. A fundamental principle of ecotoxicology is embodied in the notion of change. Ecosystems themselves are constantly changing due to natural processes, and it is a challenge to distinguish the effects of anthropogenic activities against this background of fluctuations in the natural world. With the frustratingly large, diverse, and ever-emerging sphere of environmental problems that ecotoxicology must address, the approaches to individual problems also must vary. In part, as a consequence, there is no established protocol for application of the science to environmental problem-solving. The conceptual and methodological bases for ecotoxicology are, however, in their infancy, and thus still growing with new experiences. In deed, the only robust generalization for research on different ecosystems and different chemical stresses seems to be a recognition of the necessity of an ecosystem perspective as focus for assessment. This ecosystem basis for ecotoxicology was the major theme of a previous publication by the Ecosystems Research Center at Cornell University, a special issue of *Environmental Management* (Levin et al. 1984). With that effort, we also recognized an additional necessity: there should be a continued development of methods and expanded recognition of issues for ecotoxicology and for the associated endeavor of environmental management.

Biology for AP<sup>®</sup> courses covers the scope and sequence requirements of a typical two-semester Advanced Placement<sup>®</sup> biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP<sup>®</sup> Courses was designed to meet and exceed the requirements of the College Board's AP<sup>®</sup> Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP<sup>®</sup> curriculum and includes rich features that engage students in scientific practice and AP<sup>®</sup> test preparation; it also highlights careers and research opportunities in biological sciences. The Smart & Innovative Book from Disha 'NTA NEET 101 Speed Tests' contains: 1. 96 Chapter-wise + 3 Subject-wise + 2 Full Syllabus Tests based on the NCERT & NEET Syllabus. 2. Carefully selected Questions (45 per Chapter /Subject & 180 per Full Test) that helps you assess & master the complete syllabus for NEET. 2. The book is divided into 3 parts: (a) 96 Chapter-wise Tests (28 in Physics, 30 in Chemistry & 38 in Biology); (b) 3 Subject-wise (1 each in Physics, Chemistry & Biology); (c) 2 Full Test of PCB. 3. Time Limit, Maximum Marks, Cutoff, Qualifying Score for each Test is provided. 4. These Tests will act as an Ultimate tool for Concept Checking & Speed Building. 5. Collection of 4815 MCQ's of all variety as per latest pattern & syllabus of NEET exam. This book, if completed with FULL HONESTY, will help you improve your score by 15-20%. A Must Have Book in the last 3-4 months of the exam and can be completed in 105 Hrs.

Interactions between competitors, predators and their prey have traditionally been viewed as the foundation of community structure. Parasites – long ignored in community ecology – are now recognized as playing an important part in influencing species interactions and consequently affecting ecosystem function. Parasitism can interact with other ecological drivers, resulting in both detrimental and beneficial effects on biodiversity and ecosystem health. Species interactions involving parasites are also key to understanding many biological invasions and emerging infectious diseases. This book bridges the gap between community ecology and epidemiology to create a wide-ranging examination of how parasites and pathogens affect all aspects of ecological communities, enabling the new generation of ecologists to include parasites as a key consideration in their studies. This comprehensive guide to a newly emerging field is of relevance to academics,

practitioners and graduates in biodiversity, conservation and population management, and animal and human health.

This new edition is revised throughout and includes new and expanded information on natural resource damage assessment, the latest emerging contaminants and issues, and adds new international coverage, including case studies and rules and regulations. The text details key environmental contaminants, explores their fates in the biosphere, and discusses bioaccumulation and the effects of contaminants at increasing levels of ecological organization. Vignettes written by experts illustrate key themes or highlight especially pertinent examples. This edition offers an instructors' solution manual, PowerPoint slides, and supplemental images. Features: Adds all new discussions of natural resource damage assessment concepts and approaches Includes new vignettes written by leading guest authors Draws on materials from 2,500 cited sources, including 400+ new to this edition Adds numerous new entries to a useful glossary of 800+ terms Includes a new appendix discussing Brazilian environmental laws and regulations added to existing appendices outlining U.S., E.U., Chinese, Australian, and Indian environmental laws Fundamentals of Ecotoxicology: The Science of Pollution, Fifth Edition contains a broad overview of ecotoxicology and provides a basic understanding of the field. Designed as a textbook for use in introductory graduate or upper-level undergraduate courses in ecotoxicology, applied ecology, environmental pollution, and environmental science, it can also be used as a general reference for practicing environmental toxicologists.

Although community level toxicity testing is now being used for practical purposes, it is not the intent of this book to espouse the use of community level testing in all situations or to replace single-species tests that are the best source of information on growth, reproductive success, behavior, and a variety of other end points. On the other hand, since field validation of laboratory predictions is becoming increasingly important and since community level testing offers the possibility of validation by using more comparable or identical end points in complex natural systems, which is not possible for single-species tests, it is now worthy of attention by ASTM members.

Many industrialized and developing countries are faced with the assessment of potential risks associated with contaminated land. A variety of human activities have left their impacts on soils in the form of elevated and locally high concentrations of potential toxicants. In several cases sources have not yet been stopped and contamination continues. Decisions on the management of contaminated sites and on the regulation of chemicals in the terrestrial environment require information on the extent to which toxicants adversely affect the life support function of soils. Ecological insights into the soil as an ecosystem may support such decisions. This book reviews the latest ecological principles that should be considered in this respect.

Ecosystem Management Additional Actions Needed to Adequately Test a Promising Approach DIANE Publishing Ecosystem Management Joint Oversight Hearing Before the Subcommittee on Oversight and Investigations, Committee on Natural Resources, and the Subcommittee on Specialty Crops and Natural Resources, Committee on Agriculture, and the Subcommittee on Environment and Natural Resources, Committee on Merchant Marine and Fisheries, House of Representatives, One Hundred Third Congress, Second Session ... Hearing Held in Washington, DC, September 20, 1994 Community Toxicity Testing A Symposium ASTM International

Monitoring is integral to all aspects of policy and management for threatened biodiversity. It is fundamental to assessing the conservation status and trends of listed species and ecological communities. Monitoring data can be used to diagnose the causes of decline, to measure management effectiveness and to report on investment. It is also a valuable public engagement tool. Yet in Australia, monitoring threatened biodiversity is not always optimally managed. Monitoring Threatened Species and Ecological Communities aims to improve the standard of monitoring for Australia's threatened biodiversity. It gathers insights from some of the most experienced managers and scientists involved

with monitoring programs for threatened species and ecological communities in Australia, and evaluates current monitoring programs, establishing a baseline against which the quality of future monitoring activity can be managed. Case studies provide examples of practical pathways to improve the quality of biodiversity monitoring, and guidelines to improve future programs are proposed. This book will benefit scientists, conservation managers, policy makers and those with an interest in threatened species monitoring and management.

Summarises understanding of global change interactions with terrestrial ecosystems.

In this book, the authors examine the governance of marine protected areas (MPA), and in particular they compare two different forms of governance – co-management (CM) and adaptive co-management (ACM). CM is characterized by the decentralization of the decision-making process, incorporating the governed as well as the government. ACM is characterized by the dynamic process whereby co-management decision-making is made continuously responsive to the changing ecological and socio-economic circumstances of the MPA. The authors carry out a comprehensive critical analysis of CM and ACM before applying these concepts to the case study of the Cayos Cochinos Marine Protected Area off Honduras to assess two successive management cycles, 2004-9 and 2008-13. The area was designated as an MPA in 1993, a governmental decision which was met with resentment by local communities. CM was introduced in 2004 to involve these local stakeholders in the decision-making process, but achieved limited success. In an attempt to deal with these deficiencies, ACM was adopted in the second management plan in 2008, but whereas the position of the local communities improved, it tipped the scales too far away from conservation. A third management plan is currently being prepared that promises to strike a better balance between ecological and socio-economic objectives. A central theme of the book is to examine how far the CCMPA adhered to the principles of CM and ACM respectively in its first two management plans.

It is widely theorized that population and community processes such as competition, predation, and dispersal influence rates of resource flux within ecosystems. Likewise, the properties of an ecosystem, such as resource availability and space, can feed back onto populations and communities, driving their dynamics and evolutionary trajectories. However, empirical research connecting community and ecosystem-level processes remains a critical missing link between these two disciplines. My dissertation attempts to resolve some of these deficiencies by capitalizing on the tractability and replicability of experimental and natural microbial communities. I use these systems to test a number of theories of community-ecosystem feedbacks. In chapter 1, I test the theory that a bioregion's time-integrated area and productivity positively drive the extent of diversification in a radiating lineage. This theory of time-integration was developed in response to mismatches in the taxonomic diversity observed in a region (e.g., an island) compared to values predicted from species-area or species-productivity relationships. Time-integration implies that if a region's historical area and productivity were higher than they are today, then its unexpectedly large biodiversity (for its contemporary area and/or productivity) might be explained by historical conditions favoring radiation and a persistence of many or all of these clades as area and/or productivity decreased. To test this theory, I used the bacterium *Pseudomonas fluorescens* SBW25 -- a model system for adaptive radiation. I set up independent replicate microcosms that were randomly assigned to different volumes and productivities and transferred every few days so as to experience different environmental histories. By tracking these diversifying communities over time, I demonstrate that time-integrated productivity was the single best predictor of a



community's extant diversity whereas "snapshot" measures of contemporary volume and productivity are much less useful predictors. I interpret these results in the context of population growth parameters and extinction rates. In chapter 2, I present the results of a field study of natural microbial digestive communities occupying leaves of the carnivorous pitcher plant *Darlingtonia californica*. I combine microscopy, biochemical assays, and community sequencing with respirometry and stable isotope pulse-chase experiments to examine how microbial community succession influences rates of detrital turnover, respiration, and nitrogen cycling in developing micro-ecosystems. I demonstrate that microbial community development and turnover in *D. californica* proceeds in parallel over time with communities becoming more similar to one another. These communities have considerably predictable dynamics such that the bacterial communities from one population can be used to quite accurately predict the ages of pitcher leaves in a different population and year. Furthermore, and in accordance with general successional theory, bacterial communities tended to display unimodal patterns in species diversity over time. This trend appeared driven by differences in the predicted functional properties of bacterial communities. I also encountered unimodal trends in rates of decomposition by the digestive community and nitrogen uptake efficiency by the host leaf. Bacterial diversity and bacterial and midge larvae biomass were positively associated with rates of decomposition, which in turn were positively associated with the efficiency of nitrogen uptake by the host leaf. This study is among the first to demonstrate predictable successional patterns and biodiversity-ecosystem functioning relationships in natural microbial communities. In chapter 3, I present the results of a laboratory experiment demonstrating a decrease in the strength of biodiversity-ecosystem function (BEF) relationships and competitive interactions during succession in *Darlingtonia californica* leaves. It is often assumed that as ecosystems develop, competition-colonization tradeoffs or niche differences favor the gradual establishment of a biota more successful at competing for resources, leading to increased rates of competitive exclusion and shifting BEF relationships. My approach involved collecting bacterial strains from a cohort of leaves every 11 days over a one-year period and assembling them into communities of varying richness levels such that each community contained either 1, 2, 5, or 10 taxa also isolated from leaves of the same age. By employing an experimental design that allowed for the estimation of individual species' effects as well as their interactions, I show that the relationship between community richness and carbon mineralization rates are most positive during early succession (22-55 days) and gradually decrease over time. Furthermore, diffuse competition was greatest during these same time periods. Together, these results suggest that the effects of species additions or removals on ecosystem processes can vary across time. Chapter 4 presents an experiment testing a long-held assumption regarding the natural history of *Darlingtonia californica*. Specifically, I test the centuries-old assumption that the unique forked 'fishtail appendage' found on leaves of *D. californica* play an important role in the plant's capture of arthropod prey. In a series of field experiments, I manipulated the presence/absence of the appendage on developing pitcher leaves and compared their prey compositions and biomass. I found that the absence of the fishtail appendage does not significantly impact prey capture success at the level of the individual leaf or within an entire population of leaves. Therefore, contrary to widespread beliefs, the fishtail appendage does not appear to be a critical adaptation enabling carnivory in

this species. Instead, I propose three alternative scenarios for the evolutionary maintenance of this structure: 1) as a vestigial structure, 2) as a photosynthetic structure and 3) as a structure serving a potentially mutualistic role with the local insect community.

Ecologists can spend a lifetime researching a small patch of the earth, studying the interactions between organisms and the environment, and exploring the roles those interactions play in determining distribution, abundance, and evolutionary change. With so few ecologists and so many systems to study, generalizations are essential. But how do you extrapolate knowledge about a well-studied area and apply it elsewhere? Through a range of original essays written by eminent ecologists and naturalists, *The Ecology of Place* explores how place-focused research yields exportable general knowledge as well as practical local knowledge, and how society can facilitate ecological understanding by investing in field sites, place-centered databases, interdisciplinary collaborations, and field-oriented education programs that emphasize natural history. This unique patchwork of case-study narratives, philosophical musings, and historical analyses is tied together with commentaries from editors Ian Billick and Mary Price that develop and synthesize common threads. The result is a unique volume rich with all-too-rare insights into how science is actually done, as told by scientists themselves.

While ecosystem management requires looking beyond specific jurisdiction and focusing on broad spatial scales, most planning decisions particularly in the USA, are made at local level. By looking at land-use planning in Florida, this volume recognizes the need for planners and resource managers to address ecosystem problems at local and community levels. The factors causing ecosystem decline, such as rapid urban development and habitat fragmentation occur at the local level and are generated by local land use policies. This book argues that understanding how local jurisdictions can capture and implement the principles of managing natural systems will lead to more sustainable levels of environmental planning in the future.

A contribution to the ongoing debate about how to manage the growing risks of anthropogenic chemicals in the environment, *Essentials of Toxic Chemical Risk* weaves together coverage of the science that underlies toxic chemical risk assessment, the physiological and molecular bases of chemical toxicity, the process of assessing toxic chemical risk to human health and the environment, and the strategies employed in managing it. The book links toxic chemical risk to the real world of people and communities confronted with the vexing problem of how to deal with products that make their lives better but that also harbor a potential for harm. The book introduces the basics of toxicology from a risk assessment perspective, using a jargon-free, journalistic style that makes scientific concepts accessible to a wide audience without "dumbing down" the science. It covers the fate and transport of chemicals in the environment, dose-effect, animal toxicity testing, human epidemiology, the uptake, distribution, and elimination of toxic chemicals including first-order rate constants and calculations of body burdens, and the cellular basis of cancer and other diseases that can be caused by toxic chemicals. The book also introduces risk management and discusses the balance between precaution and socio-economic benefits, as embodied by the Toxic Substances Control Act, the Canadian Environmental Protection Act, and the European Union's innovative REACH directive (Registration, Evaluation,

Authorization, and Restriction of chemicals). Putting equal emphasis on the twin issues of risk assessment and risk management, the author has carefully selected topics that shed light on risk management decisions and cover ecotoxicology and organismic toxicology. The book provides a thorough introduction to the science of toxicology and to the policy debates and scientific uncertainties that make risk management a work in progress.

[Copyright: 563b310a511dcc256c7341ecfa6f6d9b](#)