by people" (p. 762). This volume is not a cookbook for management, but I believe that many resource managers and policymakers will find in it meaningful ideas that can form the basis for action.

Resource managers, ecologists, conservation biologists, and others will find this book to be an excellent desktop reference for the biodiversity issue. The array of topics and the extensive literature citations would make even the most discerning scientists happy. I also think that this book would be ideal for a survey graduate course in conservation biology, especially because it provides linkages among scientific principles, practical applications, case studies, management options, and policy debates. This book will certainly be found in a prominent place on my bookshelf!

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Reference cited

NO NATIONAL PARK IS AN ISLAND


Edited books frequently have a number of shortcomings—uneven editing, questionable diversity of topics, and poor integration of chapters. Moreover, the information in them is often of limited interest to students or a general audience. Such is not the case with Science and Ecosystem Management in the National Parks, which was edited by William L. Halvorson and Gary E. Davis, both research scientists and administrators with the National Biological Service (NBS). Halvorson and Davis and the authors of the individual chapters contribute to the broadening dialogue that national park management should be based on long-term ecosystem and landscape-level research and monitoring rather than on the priorities of political or vested interest groups.

Chapters 3-14 present 12 case studies that highlight many of the challenging issues facing park resource managers (and the citizenry). These chapters provide examples of how basic and applied research, combined with long-term monitoring, have been and will continue to be effective in the sustainable management of our national park system. In the final two chapters, the editors summarize and highlight the issues involving park resources. These identify six major issues: ecosystem integrity and esthetic degradation, polluted air, altered water quantity and quality, resource consumption, alien species invasions, and visitor impact. These issues could, perhaps, have been more appropriately summarized as the conservation of species, habitats, ecosystems, watersheds, and landscapes; the impact of human and alien species on the structure and function of all levels of ecological organization within parks; and the management policies and strategies necessary to protect and restore threatened biotic (plant and animal) and abiotic (geological and hydrological) resources within national parks and the surrounding landscapes for future generations.

Readers are encouraged to begin by reading chapters 1, 2, 15, and 16, which provide a historical perspective on and an overview of the case studies that were selected. This overview will help readers to better understand the complexity and scope of the resource management challenges presented in the case studies, to comprehend the importance of long-term research (basic and applied) and long-term monitoring in finding solutions to these challenges, and, most important, to recognize that these resource management issues will continue into the twenty-first century.

The representative case studies are presented by resource managers that illustrate why long-term research and monitoring are necessary for policymakers to make sound management decisions. Chapter 3, by David J. Parsons and Jan W. van Wagendonk, illustrates the need for and the role of fire as a management tool in the Yosemite, Sequoia, and Kings Canyon National Parks of the Sierra Nevada. This chapter demonstrates how long-term research and management practices have helped to educate citizens about the role that fire has played in shaping these landscapes.

Chapter 4, written by John D. Varley and Paul Schullery, provides a management history of the cutthroat trout population in Yellowstone National Park. This chapter is particularly interesting for students and scholars because it demonstrates how a species (i.e., a population) management approach—especially one whose recreational value is high—has evolved to higher levels of organization; community (through the species’ relationship to white pelicans, ospreys, and grizzly bears) and ecosystem (carrying capacity and habitat quality). The authors term this phenomenon the “ecological ripple effect”; this levels-of-organization approach and increased understanding illustrate how reductionist, disciplinary research can, and logically should, evolve to holistic, interdisciplinary research and management practices.

Chapter 5, by R. Gerald Wright, describes the long-term moose–wolf population dynamics in Isle Royale National Park. Studies of these dynamics began in 1958 with Durward Allen’s initial investigations and have been continued by his graduate student Rolf D. Peterson. After nearly four decades of monitoring this predator–prey relationship and of gaining keen insights into wolf ecology and the quality of the food eaten by the moose population, Peterson has found that the wolf population is declining, and there is a distinct possibility that the next chapter in this story may result in the unplanned opportunity to study the process of extinction. Should the wolf population disappear, perhaps due to genetic deterioration, this population would be one of the first in which researchers and park managers could examine the causes and process of extinction.

Chapters 6 (“Saguaro Cactus Dynamics,” by J. R. McAuliffe) and 9 (“Urban Encroachment at Saguaro National Monument,” by W. W.
 McAuliffe describes how a misdiagnosis of the cause of the decline of the giant cactus (Carnegiea gigantea)—which was mistakenly attributed to a bacterium (Erwinia carnegeiana)—may have delayed research into alternative explanations, such as climate variability or pollination ecology, for over two decades. Shaw analyzes the potential effects of increased urbanization of Tucson, Arizona, on Saguaro National Monument, including the likely responses of both native animals (e.g., mule deer, desert tortoise, and collared peccary) and domestic animals (e.g., dogs and cats) to increased urbanization within and along park boundaries. The need for a multidisciplinary approach lends credence to the idea that these two chapters should have been combined into a single joint discussion.

The threat of and management plans for the invasion of alien species is discussed in chapter 7 with, appropriately, Haleakala and Hawai Volcanoes National Parks serving as models for this large-scale management and restoration challenge. This chapter illustrates how the introduction of alien species has contributed to Hawaii becoming a major area of extinction. For example, 75% of the nation’s historically documented plant and animal extinctions have occurred on these islands.

Chapter 8, by Owen A. Williams et al., provides a detailed account regarding protection of the Devil’s Hole pupfish, Cyprinodon diabolis, which is found at Devil’s Hole within Death Valley National Monument. This chapter describes how long-term (since 1956) monitoring of the water level in Devil’s Hole and the more recent increase of water use by major companies outside the area resulted in a Supreme Court ruling (United States v. Cappaert) protecting federal reserved water rights, including the underground hydrology outside of Devil’s Hole. This chapter provides a compelling case that monitoring, research, endangered species, hydrology, and environmental law should be investigated and practiced in a holistic watershed manner—that is, no park is an island.

A clearer illustration of the underground hydrology and watershed approach, including its cultural and economic ramifications, is provided by the long-term karst hydrological research conducted at Mammoth Cave National Park in Central Kentucky (chapter 10). E. C. Alexander Jr. describes the historical, political, geological, economic, and management interactions (and the personalities) that have defined the research and management strategies of the world’s longest cave and best documented karst ecosystem. This chapter describes how the clash of wills or “degrees of cooperation” among park superintendents, research scientists, and volunteers has profoundly affected management decisions at certain times in its history. (Mammoth Cave National Park was formally dedicated on 18 September 1946.) This vivid chapter also describes the profound socioeconomic impact of the park on the region outside of it and the difficulties in managing a resource of this scale and involving human impact, threatened species, and water quality.

Chapter 11 (“Air Quality in the Grand Canyon,” by Christine L. Shayer and William C. Mann) further develops the “no park is an island” theme by describing how research (conducting an air-tracer experiment and building a network of monitoring stations) to improve air quality has also improved the esthetic quality of one of the world’s most iconic landscapes. Readers will better understand why the Clean Air Act is crucial to ensuring the integrity of air quality for airsheds, such as Yellowstone National Park and its environs.

The role of the Endangered Species Act and the “protection versus use” issue is described in chapter 12 (“Rare Plant Monitoring at Indiana Dunes National Lakeshore,” by Noel B. Pavlovic and Marlin L. Bowles). This chapter, along with chapters 13 (“Wilderness Research and Management in the Sierra Nevada National Parks,” by Jan W. van Wagendonk and David J. Parsons) and 14 (“River Management at Ozark National Scenic Riverways,” by Kenneth Cham, David Foster, and Thomas Aley), provides strong evidence of the need to quantify and manage human impact on wilderness and stream–riverway ecosystems. These chapters also illustrate the need to manage humans as part of—rather than outside of—the ecosystem. The book could have placed stronger emphasis on the esthetic component of human value as it relates to awareness of and significance to wilderness within the ecosystem concept (e.g., Hough 1995).

Some readers may find fault with the book because it omits their region of the country or their favorite national park, including its present threats, such as proposed titanium mining near Okefenokee National Wildlife Refuge or oil drilling that continues to threaten national parks in Alaska. However, this book does provide a rich diversity of case studies that offer keen insights into large-scale and long-term management needs and problem-solving strategies—strategies that relate to all national parks and refuge areas. It was, however, disappointing to realize that only two women were given voices as contributors; perhaps the inequity of human resources is in need of restoration in the park management system.

Although some of the earlier literature stressing the need to view national parks as ecological systems (e.g., Houston 1971), to develop new integrative problem-solving strategies for park resource management (e.g., Barrett 1985), and to apply ecological theory at greater temporal and spatial scales (e.g., Lubchenco et al. 1991) were not included, these omissions do not detract from the important lessons contained within this book. The message is that management success results from integrating research with monitoring, theory with practice, and disciplinary with interdisciplinary approaches.

Halvorson and Davis identify five themes from the six major issues addressed in the case studies: ecosystems are dynamic, no park is an island, knowledge is better than ignorance, sustained research reveals secrets that short studies never do, and research must be a cooperative effort. They note that the relationship between research and management has become even more complicated because of the creation of NBS within the US Department of Interior. The research and management administrative structure of NBS has changed since the publication of this book, increasing the potential complications with NBS, which is now
Chemical arsenals of plants


Before reading further, you should know that I am a botanist, not a biochemist. Certain parts of this book have much more to do with biochemistry and molecular biology than the title suggests. The book originated from a 1995 symposium of the Phytochemical Society of North America and consists of 12 chapters; some describe the theory of so-called chemical defenses in plants and microbes, but the majority describe chemical attributes in specific taxa. The word "redundancy" in the title has a special meaning that became clear only on the last page of text, where the theory of chemical defenses is defined.

The first chapter, by M. R. Berenbaum and A. R. Zanger, carefully discusses interpretations of the origin and maintenance of the multitudes of plant secondary compounds. This articulate discussion is part of the arguments between selectionists and neutralists in recent decades over whether the word "adaptation" should appear in print. Due to their extensive experience with phytochemicals, the authors have provided many examples of interactions among plants, their phytochemicals, and other organisms. Their story of parasins and their furanocoumarins, including historic connections with human ailments, is the first of the cautionary tales that add spice to the book.

Several excellent chapters (2, 3, 6, 7, and 9) trace the activity of phytochemicals within specific taxa of plants. R. L. Lindroth and S.-Y. Hwang (chapter 2) discuss compounds found in two North American aspens, especially quaking aspen (Populus tremuloides), which possesses a suite of biologically significant compounds derived from shikimic acid. These workers have shown that some of the aspen's predator-deterrent compounds are inducible, whereas others are ubiquitous. They summarize the environmental requirements for synthesis of these compounds and the effects that they have on various organisms, such as beavers, who carry out selective aspen cutting.

The chemical defenses and attractants in the mustard family (Brassicaceae) are discussed in chapter 3 by J. A. A. Renwick. Mustard oil glycosides, which are common throughout the family, attract certain Pierid butterflies and other insects that oviposit in mustards, while discouraging other insects. A wealth of other complex responses inspires one to watch cabbage butterflies more closely. I strongly recommend the "Balancing Stimulants and Deterrents" section, which gives ecological interpretations.

Chapter 9, by C. P. Constabel et al., provides a progress report on promising work on defensive compounds in tomato. The authors discuss how certain common enzymes (polyphenol oxidases) cause necrosis in injured tomato tissue and can act as defense mechanisms against herbivory.

A plant that is well known for its phytochemicals is the Neem Tree (Meliaceae), which has received much attention in the pseudoscientific press. In chapter 6, M. B. Isman et al. write about this fabled plant and show that the truth is even more remarkable than much of the fiction. Neem has had considerable economic success in pest control, especially with insects. The authors link patterns of pest control with specific compounds found in the Neem Tree and certain other members of the Meliaceae. The long list of references may reflect the great interest in this plant's potential for future uses.

Finally, R. G. Cates (chapter 7) deals with terpene defense systems in conifers and their impacts on insects and fungal pathogens. This chapter does two things well: it reviews much of the literature on conifer pathogens and it compares the effectiveness in deterrence of pure compounds and mixtures of chemicals. This paper succeeds in pointing to new avenues of research on coniferous phytochemicals.

A second excellent set of papers treats the phytochemicals in a more general way, selecting large, and