

It is chapter 17 on energy flow and nutrient cycling that really fulfills the primary purpose of this textbook and sets it apart from and above most others in the field.

The expanded table of contents is good for rapid reference, as is the index. The graphic aids are revealing and well placed in the text, but chapter summaries are missing and needed. The literature cited section is current and extensive.

This thought-provoking informative textbook is a fairly ambitious presentation of present-day ecology. The author has successfully met his goal of presenting quantitative ecology to the non-math student.

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MAN, NATURE AND ECOLOGY, by Keith Reid, J. A. Lauwerys, Joyce Joffe, and Anthony Tucker. 1974. Doubleday and Co., Inc., Garden City, N.Y. 426 p. \$14.95 (hardback).

It is refreshing to find a book about man and his environment that is different. The subject is introduced with striking pictorial essays of the most pressing environmental problems: population, food supplies, resources, pollution, endangered species, and urban failure. The text begins by describing natural ecosystems and how they function, presenting basic ecological principles in very understandable terms. The emphasis is on energy relationships and efficiencies, biogeochemical cycles, and adaptations of organisms to the varieties of geographical and climatic conditions which they encounter.

Man's impact on his world ecosystem is discussed in relation to the stages of his civilization, from hunter-gatherer to herdsman, agriculturalist, and machine-age manipulator. Each of the stages is described in ecological terms, with its accompanying use and misuse of resources at hand. Thus these chapters point out how man's manipulation of his environment has gradually produced the problems we encounter today. The impact of man's interference with his environment has increased in direct proportion to man's population size, so that it is the present scale of his manipulations that is so truly frightening.

The book concludes with examination of possible patterns of action and reaction that can take place in the future, concentrating on the areas of population, natural resources, capital investment in industry and agriculture, and pollution. A summary of these actions is presented in a blueprint for a new kind of civilization by 2075, which proposes necessary steps toward self-sufficiency and self-regulation. Another

blueprint provides specific actions that each individual can take toward achieving these goals.

This volume would be valuable to any library, be it school, classroom, or home. It is a thoughtful and constructive examination of the why and wherefore of today's massive environmental problems, and as such would also be a stimulating ecology textbook.

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COMMON MARSH, UNDERWATER AND FLOATING-LEAVED PLANTS OF THE UNITED STATES AND CANADA, by Neil Hotchkiss. 1972. Dover Publications, Inc., New York. 228 p. \$3.00 softback.

This book is a combination of two previous publications of the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, authored by Neil Hotchkiss: *Common Marsh Plants of the United States and Canada*, 1970, and *Underwater and Floating-Leaved Plants of the United States and Canada*, 1967. Its organization is based on the two prior publications, comprising two separate sections, each with its own title, contents, introduction, page numbering, and index. This procedure has its slight disadvantage to the user by the necessity of locating the separate subsections for the contents of the book and page references of included species. A convenience of the subsection organization for reference purposes, however, is that each species is associated with others of similar appearance into subgroups within the titled subsection, thereby reducing the number of subgroups the user must survey. The subsection organization is also advantageous in limiting the introductory content to specifics about each major group of plants, reducing the total volume the reader must peruse to familiarize himself with each particular reference group. All the plant species included in this book are indexed according to both their scientific and common names. The author cites three taxonomic references within the introduction of both subsections. These references are more technical and each encompasses a specific region of the geographic area incorporated within this book and, thus, may supplement its use.

The validity of this book is questionable only if the user is a dedicated taxonomic "lumper" or "splitter" because Hotchkiss may be classified as both, depending upon the cross-reference source. However, the author notes discrepant species names by the cited authorities for those used in this book, both in the introductions and the main text but his practice is not consistent with any one reference. This book is most useable to the beginning taxonomist because its content of specific characters is inadequate for definitive

classification of most of its inclusive species. Although the book includes a few pteridophytes, bryophytes, and algae, it is predominantly a taxonomic reference of flowering plants. There are over 750 illustrations but all are drawings, some rather crude and somewhat deviant from similar illustrations in more technical references. For general use, however, the deviations may not be severely limiting and may primarily be variations in visual interpretation of the particular characters. To further illustrate the general nature of this book, the author repeatedly uses the term "seed" for fruit and "pod" for a variety of fruit forms. Since there is no definition of terms, one can only assume the reference is written in general terminology for the novice. The author also departs from standard taxonomic procedure by failing to capitalize species names taken from proper nouns.

This book is an adequate reference for use by students at the beginning taxonomic level, either high school or college, and for general ecological use within the specified habitats. It is relatively inexpensively priced and, although softback, is very durably constructed, adequate for field or classroom use. The paper quality is good, the print and illustrations are outstandingly clear and legible, the pages fold flat, and there is adequate space for field notes on each page.

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THE BIOLOGY OF THE OCEANIC PACIFIC, ed. by Charles Miller. 1974. Oregon State University Press, Corvallis. 157 p. \$6.00 (hardback).

This small book is a collection of seven papers presented at the thirty-third annual biology colloquium held at Oregon State University. The papers were designed to survey advances in knowledge of the oceanic Pacific since the *Challenger* expedition.

The lead paper by McGowan on oceanic ecosystems provides an update on plankton distribution and ecosystem characteristics. It is informative and will be of interest to advanced high school and college level ecology students. McGowan acknowledges areas of inadequate information and problems of collecting and interpreting data.

Papers by Parsons and de Lange Boom dealing with physical, chemical, and biological factors controlling ecosystem processes in the sea; Frost writing on "Feeding Processes at Lower Trophic Levels in Pelagic Communities"; Rothschild concentrating on fishery production from catches and food chain dynamics; and Hochachka on enzymatic adaptations by marine organisms to oxygen, temperature, and pressure are more specific, somewhat mathematical, and directed at the specialist in the field. An excellent paper

by Hessler entitled "The Structure of Deep Benthic Communities from Central Oceanic Waters" compares major community changes in standing crop, diversity and trophic structure of the benthos of deep ocean gyres, and shallow inshore waters.

Most informative and enjoyable is the concluding paper "One Hundred Years of Pacific Oceanography," by Hedgpeth. His extensive knowledge and wit provide the reader with an excellent survey of advances in Pacific oceanography since 1872. Students of oceanography should place this paper on their reading lists.

The Biology of the Oceanic Pacific is best suited for students with a background in ecology or oceanography. High school instructors will find some papers of use for their classes, but most benefit will be gained by individuals at the college level.

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ECONOMICS OF ENVIRONMENTAL IMPROVEMENT, by Donald T. Savage, Melvin Burke, John D. Coupe, Thomas D. Duchesneau, David F. Wihry and James A. Wilson. 1974. Houghton Mifflin Co., Boston. 210 p. \$4.50 (softback).

Teachers of environmental education, economics, environmental resources, and similar courses, as well as students interested in the diverse problems encountered while studying about the quality of the environment, should find this book to be of value. Whether used as a basic textbook, resource book, or for general supplemental reading purposes, this book, interdisciplinary in scope and philosophy, is most useful in supplying a basic understanding of the many economic intricacies involved in the process of ameliorating the nation's environmental problems. Since the true definition of environmental education is a most encompassing one and should include a basic understanding of many disciplines, including economics, this book should help to fill the economics void created so often in the vast array of published material that deals with environmental topics. One senses the urgency for a closer working relationship between experts in all fields for the purpose of devising solutions and preventative schemes in examining environmental insults, as a result of reading this book.

Although basically the book is centered around economics theory and principles, the authors have supplied relevant background information about the causes of pollution (though sometimes simplistic) in order to give the reader a reasonable understanding of the interrelationships involved in analyzing environmental problems. The examples used are representative of some

of the nation's most pressing industrial problems; the treatment given to the relationship between various industries and newspaper production is illustrative of the book's theme of relevance and its succinct presentation is easily understood. The interdependence of producers and consumers in this example emerges as an unmistakable reality when one looks at today's economy. Unmeasurable factors resulting from environmental degradation, such as aesthetics, personal feelings, and the various adversities attributed to psychological manifestations suffered by diverse segments of society, are given just consideration throughout the book. These oftentimes unmeasurable parameters of environmental insults are rarely considered (but should be) when assessing the true nature of the environmental problems faced by humankind.

The chapter on costs involved in pollution abatement directs itself to the problems of air and water. The explanations of state and federal rules and regulations, combined with economic ramifications, are excellent. Regardless of the time period cited, the data presented are highly significant in terms of the overall impact on the economy. The authors stress that pollution abatement analysis is only one step that should be used in setting environmental improvement standards, and a separate chapter more than adequately covers the basic policy alternatives—regulation, user charges, effluent charges, and subsidies—that follow initial analyses.

Environmental improvement and preservation as related to compensation theories and practices are adequately discussed in conjunction with political ramifications and influences on employees and business management. The reader is presented with both sides of the arguments, and it is pointed out that, given enough time, most industries should be able to meet certain standards leading to improved environmental qualities. The role of the consumer as the enforcer of regulations is stressed throughout the book.

In terms of the total implications and broad meaning of environmental awareness and education, this book adequately serves as a basic primer in leading one to understand the so-called hidden micro- and macroeconomic effects that are prevalent in the struggle between economic growth and environmental improvement. The bibliographical notes and index make this book highly usable and most valuable as a ready source of information. A number of lessons, using economics as a vehicle leading to a better understanding of environmental problems, can be derived from this book. It should prove to be a welcome addition to the reference shelf of any teacher or student seriously concerned with the environment.

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THE WHALE PROBLEM: A STATUS REPORT, ed. by William E. Schevill. 1974. Harvard University Press, Cambridge. 423 p. \$12.95 (hardback).

Since many people have recently become alarmed by the decline of whale populations throughout most of their range, this book is obviously timely, perhaps late. It is a compilation of revised papers originally presented at the International Conference on the Biology of Whales, in June 1971, under the auspices of the Department of the Interior and others. The purpose of the meetings, called by Walter Hickel after he placed 8 species of whales on the endangered list, was to bring together cetologists from all over the world to discuss what was known of the biology of whales, and what further information was needed before a workable program of whale management could be constructed.

The book consists of 19 chapters, each by different authors. These have been combined into five sections which cover (i) the conference's major conclusions; (ii) the current status of whales in several geographical areas and how their distribution relates to oceanic productivity; (iii) the biology of sperm whales and the relationship between whale biology and management; (iv) sperm whales and the relationship between whale biology and management; (v) whale management and conservation, including the role and history of the International Whale Commission (IWC), mathematical treatment of population dynamics and recruitment, sampling techniques, and a protectionist's reflections on past management; and (vi) tagging and telemetric methods available or needed for direct study of whale movement.

The authors clearly show how difficult it is to properly manage a living resource when an understanding of its biology must be derived from indirect or questionable data sources. The "current status" section explains how the age or recruitment, birth rate, natural mortality, migration, social structure, and past and present stock (population) sizes are estimated from whaling and sight records and autopsies of dead whales. From these, the rate of recruitment, "sustainable yield" (s.y.) and "maximum sustainable yield" (m.s.y.) are calculated in section four. Proper management demands that only the "surplus" be taken, and determining this surplus (s.y.) requires precise understanding of population dynamics and age and social structure. Considering the limitations of the data, I was surprised at the accuracy of early 1960 s.y. predictions. My impression from sections 2, 3, and 4 is that modern population theory was being used to generate whale-management proposals from questionable data. Certainly more direct observations, and increased financial support are necessary if whales are to be understood and managed.