

tivity, and reproduction under the environmental constraints of a particular ecosystem. Therefore, the optimization and self-deterministic characteristics of cybernetic models clearly point to the direction of the future. Although mathematical prowess is needed, the phytoplankton and other examples discussed indicate potential applications. Even though optimizations of nature may not coincide with human desires, these models should indicate the most expedient means of management to achieve the desired states of the ecosystem or subsystem.

The book is timely and contains a wealth of information and ideas that should stimulate further development. Goals set are conservative, an important character in view of the past situation of expecting too much too soon from modelling. The book is good support material for quantitative analyses of freshwater ecosystems.

ROBERT G. WETZEL  
*Department of Biology*  
*The University of Michigan*  
*Ann Arbor*  
*MI 48109 U.S.A.*

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#### AFRICAN WETLAND VEGETATION

*The Ecology and Management of African Wetland Vegetation*, edited by Patrick Denny. Dr. W. Junk Publishers, Dordrecht, 1985, hardcover, 344 pp., Dfl. 250.00/£69.25/U.S.\$78.50, ISBN: 90-6193-509-1.

Freshwater resources are, of course, critical worldwide but are particularly important in the African continent. The lack of a summary evaluation of African wetlands and their vegetation was recognized as a primary need by the 1979 SIL-UNEP Workshop on African Limnology. The book later evolved from the Scientific Committee on Problems of the Environment Wetlands Project. Under the editorial guidance of P. Denny, the five authors (P. Denny, D.S. Mitchell, C. Howard-Williams, J.J. Gaudet and K. Thompson), representing the expertise on African aquatic plant biology and ecology, have assembled a comprehensive and delightfully interesting account of the wetland resources of this continent. Because most of these scientists have since left Africa, it is particularly appropriate and important that they have summarized their collective expertise in this volume.

A conspicuous characteristic of African wetlands is the marked environmental seasonality to which the vegetation is exposed. Large areas of floodplains shift within a few months from productive wetlands to arid dry lands. The

authors carefully emphasize what these extremes in water availability are, how the changes differ geographically and the stresses that surviving vegetation must tolerate. In some instances, the morphological and physiological adaptations of the vegetation are sufficiently well known to permit detailed discussion and integration into the general ecological constructs of African wetlands.

The abundance of photographs of African wetlands and vegetation is a particular asset of this book. Although usually not of exceptional quality, the photographs often convey the authors' meanings and intentions more effectively than words can. This conceptualization is important because most readers have not had the privilege of examining the wetlands directly.

Denny begins with an introductory chapter of definitions, classifications of life forms and methods of vegetation analysis. Of the entire book, excellent in most regards, these introductory remarks are rigid, dogmatic and in a few cases, misleading. Wetland and littoral ecology has been plagued with terminology and ambiguous definitions. Denny's creation of further superfluous terms (e.g. euhydrophytes) for life forms and use of ambiguous and simplistic terms for plant succession, left me with the hope that readers will ignore this quagmire of unnecessary confusion and get on to the excellent materials, information and advice in subsequent chapters. Unfortunately, these terms are carried throughout the other chapters and one has to refer back to the vague definitions and conceptual discussions of the first chapter.

The second chapter addresses the general distribution of submersed and floating-leaved macrophytes in Africa. Ranges of common environmental factors, e.g. temperatures and salinities, are presented as a general background.

The detailed treatment of emergent plants of permanent and seasonally-flooded wetlands by K. Thompson (Chapter 3) is certainly among the best of this volume. Following an interesting summary of dominant emergent species, the wetland diversity and major wetland plant communities within reed swamps and edaphic grasslands and forests are coherently presented in sufficient detail to appreciate the great diversity compounded by the marked seasonality of environmental parameters. The brief but interesting section on tolerance, adaptations and evolution of wetland plants provides insights into the specific characteristics of tropical hydrophytes. Even though understanding is very incomplete, the potential of physiological adaptations is clearly a fruitful area for future research.

The final chapter on general plant biology addresses surface-floating aquatic macrophytes (D.S. Mitchell). The brief treatment promulgates an appreciation of adaptations that permit these species to dominate many water bodies in tropical regions.

Two lengthy chapters address the general wetland ecosystem structure and functioning of submersed and floating vegetation (P. Denny) and swamps dominated by emergent vegetation (C. Howard-Williams and J. Gaudet). These summaries integrate ecological and certain physiological information from

nontropical plants and regions to the vegetation and rather unique conditions of Africa. Although the ubiquity of physiological controls is apparent, the individual adaptations by morphology, growth characters, and population dynamics within the communities are reviewed in some detail. In a few instances, new previously unpublished data are incorporated into the discussions. It is apparent that the wetland systems are detritus-based ecosystems, in which most of the organic matter is decomposed microbially. In a few instances, large animals, as for example the hippopotami, can consume large quantities of wetland vegetation in localized areas. Herbivory is, however, very low. The capacities for tropical wetlands to regulate nutrients are discussed, and, as in other regions, whether the wetland functions as a sink or not, depends upon the vegetation, rates of throughflow and the nutrient itself.

The three chapters of the fourth part of the book address the manifold problems caused by prolific growth of aquatic plants, their management, and the pressing needs for conservation and effective management of African wetlands as they experience ever-increasing exploitation. The summary by D.S. Mitchell of African aquatic weeds and their management poignantly attests to the problems arising from excessive growth of both endemic and introduced exotic plants. Although satisfactory solutions are difficult under even the best of circumstances, their complexity increases with the variety of political and socio-economic conditions of Africa. The call for reasoned management and conservation of largely unprotected African wetlands is the message of the concluding summaries.

Nearly 80 pages of the volume are finally devoted to a cross-indexed bibliography of African wetland plants and vegetation. Obviously, this compilation provides an invaluable service to future workers by gathering scattered and often obscure literature into a central place.

The authors of this work have assembled a summary on the ecology of African wetlands that will remain the authority on the subject for many years in the future. Apart from a few problematic idiosyncrasies, such as the unnecessarily complex terminology, the book is excellent. Not only must the book be highly recommended to all working with wetlands and certainly to all biological libraries, the volume will hopefully also be read by managerial authorities in African countries in order to enhance perceptions of the value of their wetland resources.

ROBERT G. WETZEL  
*Department of Biology*  
*The University of Michigan*  
*Ann Arbor*  
*MI 48109 U.S.A.*

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