

Ecology and Our Endangered Life-Support Systems, by Eugene P. Odum, from The Institute of Ecology, The University of Georgia. Published by Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts. Second Edition. 301 pp. (\$18.95 at the Northern Arizona University bookstore).

In this refreshing and very readable paperback book, aptly titled *Ecology and Our Endangered Life-support Systems*, Eugene P. Odum unfolds and lays out his concepts of Ecology. The principal theme of the book, (and which is now one of the 'hot' topics of ecology), is that of integrating the relationships between individual organisms, the physical environment, and human society.

The basic precepts are biological, but someone only vaguely familiar with biological terms and definitions could easily pick up this book and read, enjoy, and profit from it. Using the concepts of life support systems, first introduced in the Prologue by a detailed description of the flight and life support systems of Apollo 13 (the spacecraft crippled by an explosion in 1970), the reader is carried on a journey to understand how the earth is composed of interlocking and interacting systems that holistically add up to mankind's 'life-support.' The developed, cultivated, and natural aspects of the landscape must interact to support life as we know it now and in the future. Odum shows how these systems exist at a variety of levels, from individuals through populations and communities to the biosphere on a global scale, and how they interact synergistically.

Interestingly, one of the major components Odum inserts into the ecological picture is economics, a theme carried throughout this book. He feels that the interface

between ecology and economics is so strong that the human population problem is probably economic, or perhaps political (but he does not emphasize any biological role). His often repeated reason for the degradation of species and their environments are economic pressures. Likewise, his solution for protecting species and their environs is economics. This concept will be an ever increasingly important one for land managers trying to deal with the impact of land development contiguous to (and within) their managed lands.

Energy is addressed as a common denominator of life on earth linking ecosystems to economics. When a problem occurs—and many problems are pointed out—Odum insists that there is no quick fix. All three components (ecology, economics, energy) must be considered if any degree of long term success is to be expected. An example of one idea is to use energy as a basis for evaluating so called 'worthless land' in terms of energy produced for the biosphere upon which we all are dependent. For example, under this system one acre of tidal estuary becomes worth \$20,000 to \$50,000. Our real cost of living is not always accounted for in terms of money. This gap in our decision making process needs to be closed before the proper values can be placed on our survival in the ecological world.

However, all the basics of Ecology are also contained within this book —i.e., the food webs, energy systems, ecosystems. But what separates this work from other ecology texts is its slant to human influence. Many examples come from the impact of farming and industry, yielding a refreshing blend of scientific concepts and a dose of the real world.

These examples and others throughout the book are presented clearly in diagrams and then the same symbols are consistently used throughout the book. Therefore, all diagrams are simplistic and easily understood with consistently labeled inputs and feed-back loops. Reference is made to widely read magazines such as *Time*, and at the end of the chapters are excellent references with some notes inserted by the author.

A recurrent theme in the book is the contention that narrow economic theories and policies dominating world politics are major obstacles to achieving balance of non-market and market goods and services. Odum contends that the 1992 Earth Summit, while producing few meaningful agreements, may have opened pathways for future cooperation among nations and therefore some hope for the future. In the epilogue he states three certainties as predictions for the future: 1. human beings will continue to increase in numbers; 2. We need to do something about the fouling of our life support systems; and 3. Humanity will make a major and painful transition in energy use as fossil fuels decrease. If we could summarize the essence of this book in one statement it would be that: only when ecology and economics can be merged, and ethics extended to include environmental as well as human values, can we be optimistic for the future of mankind.

For someone wanting a purely biological, "hardcore" scientific approach to ecology, this book will be disappointing. But, for an introduction to ecology and a balanced look at ecology as it is being influenced by mankind—this book is a great starting point. The book's major value lies in Odum's approach that man is not only part of the ecosystem and biosphere, but that he is a major factor and driving force and must take some responsibility for his influences. The material contained within, and the approaches used by this author, would be enlightening for anyone from park superintendent, to resource manager, to naturalist interacting with the public.

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