
Preface

We can never solve our significant problems from the same level of thinking we were at when we created the problem.

—Albert Einstein

Humans are now reawakening to an awareness of themselves as part of the vastly complex web of life. In part, we are realizing the enormous influence our species has and the extent to which we—in our hubris—have disrupted this web, risking extinction of our own species along with countless others. Can humanity find for itself a sustainable niche within the web of life? What serves to define that niche? These are the ultimate questions addressed by this book.

Such questions were hardly so clear when this book was first conceived. In the mid-1980s, the United States' National Marine Mammal Laboratory was reorganized, partly with the intent of converting from a species-oriented structure to a discipline-oriented structure. This change was related to decisions within the National Marine Fisheries Service, along with other government and nongovernmental organizations, to take seriously management as it would involve ecosystems. I became responsible for contributing to a scientific basis for management at the ecosystem level.

I soon learned, however, that we only make a small step in the right direction when ecosystems are added to what we consider. It became clear that extending conventional concepts of management to ecosystems is causing more problems than are being solved. Full-scale change is needed, and a major part involves the way we think—our beliefs. One of the central themes of this book is that of identifying the information that most realistically provides guidance—a very select part of the information revealed by science.

I came to realize that we cannot control the nonhuman; control is limited primarily to human action. Reining in our incredible influential power serves as a form of management. The option of minimizing abnormality, to achieve health (at all levels) becomes real. We can limit our interactions with other species, with ecosystems, and with individuals (Christensen *et al.* 1996, Fowler 2005, Fowler and Hobbs 2002, Mangel *et al.* 1996). Thus, the option of managing our use of ecosystems to mimic other species emerged in my thinking as an option that has its parallels at all levels of biological organization. We, as individuals, and as a species, can manage our use of, interactions with, and influence on, other individuals, other species, ecosystems, and the biosphere. Our species is just one part of the picture. This reality requires us to face questions about the constraints and actions our species should require of itself. We need to recognize that we are part of various systems that include other species faced with the same reality and complexity that we face. Fitting in means being a normal part.

Early in my work on this book, it seemed to me that the problems that confront us could be dealt with by further consideration, acceptance, and integration of the concept of extinction—especially selective extinction and speciation. However, it soon became clear that this was not going to suffice for management either. Like other fields of science, it provides critical understanding, but could never guide decision-making by itself. Whole systems thinking also greatly influenced my own thinking. All systems are finite while complexity and

reality are not; there had to be an approach that was not confined to any one system or level in the hierarchical structure of life. All had to be taken into account.

A different perspective began to take form. The form of management that emerged was systemic management to minimize human abnormality. Realizing the potential was one of the most gratifying experiences of my career. Systemic management builds on the variety of ways we understand reality. With a major reassignment of the role of stakeholders, it conforms to the requirements of management as laid out in the literature.

In my attempt to digest the literature on management at the ecosystem level, I found frequent mention of the need for "unifying" perspectives; holism was needed. As I proceeded, the needs and the potential seemed to match. What we study are the parts of reality in its unified form: holism is found in reality; informative natural patterns emerge in this reality, integrating through emergence.

This book, then, is intended to open the door to a conversion in thinking, similar to what I experienced in the process of writing it. I see a need for the recognition and application of information more directly related to reality. All of the things that science studies are combined in nature—the reality we want to be part of in finding sustainability. That combination is what all sciences would account for if their disciplines could be united. My hope is that humans can find sustainability in this context.

I expect controversy—controversy stems naturally from change. Most controversial, perhaps, will be the conclusion that the role of values and opinions needs to be replaced. They take on an entirely different role in systemic management: motivation for asking clear management questions.

I identify problems in the conventional use of science. This is not to be misinterpreted; research and scientists are not to be branded as wrong or ill-intended. Rather than demonize science, my message concerns the identification and use of the products of science that best meet our needs for guidance.

I wrote this book for the benefit of the biota of the earth, focusing on action we humans can take, primarily as a species. As parents discover, we are not born with user guides: one title suggested for the book was "How to be a successful species." This book is part of my contribution to human success through my own individual action. If the messages and implications are troublesome, we must be mindful that benefits at the species level often require sacrifice at the individual level, sacrifices that become more extreme when ecosystems and the biosphere are included. In the spectrum of time scales, short-term benefits involve long-term costs and, conversely, short-term efforts involve long-term gains. This book is my best effort toward thinking of the welfare of future generations of the human species, and all those species that accompany and support us in life. I hope it will lead to substantive progress.