

David Greenland



Guidelines for Modern Resource Management

Soil • Land • Water • Air

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Charles E. Merrill Publishing Company
A Bell & Howell Company
Columbus Toronto London Sydney

This book is dedicated to Risa I. Palm

Published by Charles E. Merrill Publishing Company
A Bell & Howell Company
Columbus, Ohio 43216

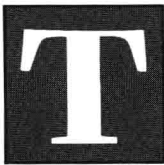
This book was set in ITC Zapf
Text Designer: Ann Mirels
Copy Editor: Mary Pound
Production Coordinator: Rebecca Money
Cover photo by Grant Heilman
Cover Design: Tony Faiola

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Library of Congress Catalog Card Number: 82-61678
International Standard Book Number: 0-675-0-20004-0
Printed in the United States of America
1 2 3 4 5 6 7 8 9 10—87 86 85 84 83

Preface



THE Department of Geography at the University of Colorado offers an undergraduate program in environmental conservation. Two key courses in this program are those called Conservation Thought, which deals with the philosophy of conservation and important trends affecting the subject, and Conservation Practice and Resource Management, which considers practical aspects of the field. When I first started teaching the latter course I realized the need for a textbook dealing with the subject from the perspective of the geographer. Those that were available were rather out of date. Most recent texts treat resource management within more specialized disciplines such as biology or geology. The core of geography lies in an examination of the spatial aspects of phenomena and in the study of the interrelationships between humans and their environment. Concentration on these areas gives the geographer a unique interdisciplinary approach that is seldom obtained by scholars in other fields. It is this approach that is used in writing this book.

I have a second reason for writing this book. Partly through talking with past students who had graduated and become professional environmentalists and partly from my own work in applied geography, I became aware that many of our traditional courses in resource management and conservation did not adequately prepare our students for what they found in

the real world. Academics have a tendency to deal with things in a simple manner, due partly to the need for ease of explanation in the classroom. Thus, for example, a straightforward account of the operation of a wastewater treatment plant might be given. Yet the reality is that most aspects of conservation and resource management are enmeshed in political, economic, and other types of issues. Permission to build a wastewater treatment plant is granted only after compliance with a large number of regulations. Consequently, in this book, I look not only at conservation and resource management in its narrow sense but also at some of the broader surrounding issues. As a result the real world should not come as quite a shock to our graduating students.

It follows that this book is written principally for students at the sophomore and junior levels who are taking courses in conservation and resource management. It should also be of value to those students who are pursuing other courses that lead to a career in environmental management. The book may also hold interest for persons who have just started careers in environmental management and are a little bewildered by all the conflicting calls on their time and expertise. At least the knowledge that they are not alone should give them some comfort.

I am very much aware of the limitations of this book. For the most part, it deals only with the United States and only with material and events of the last two decades. Furthermore, it treats only a few resources. These limitations can be rectified to some extent by complementary books from the publisher, Charles E. Merrill. But mainly the book should be looked upon as a first attempt at presentation of the ideas to be found within these pages. Ideally this book will be followed by a much more comprehensive treatment of the subject matter of conservation and resource management.

Although responsibility for any shortcomings of this book remains mine, there are many people who have helped in its preparation. I would like to thank Paul Lee, John Staples, and Greg Spatz for early encouragement with this project, Pam Cooper at Merrill for her vision and editorial expertise, and Robert W. Tope for the line illustrations. I would also like to thank a large number of people who reviewed the various stages of the manuscript and made many valuable suggestions. I am especially indebted to Roger Richman of Moorhead State University, Elliot G. McIntire of California State University at Northridge, and Marvin Baker of the University of Oklahoma at Norman, who contributed the final reviews of the manuscript. I am also very grateful to the many geography and environmental conservation students at the University of Colorado who have used early versions of the manuscript and have constructively commented

upon it. One of these students, Heléne Peckar, also typed the manuscript. Finally, I would like to thank my wife, Risa Palm, for constant support and encouragement, and my five-year-old son, John Richard Greenland, whose existence is sufficient reason for environmental conservation. I am reminded continually of the words of John F. Kennedy to the United Nations on 10 June 1963, when he observed:

For in the final analysis, our most basic common link is that we all inhabit this planet. We all breathe the same air. We all cherish our children's future. And we are all mortal.

David Greenland
Boulder, Colorado

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Overview

DURING the last two decades there has been growing interest in resource management and conservation that has been manifested in a spate of environmental legislation at all levels of government. The increase in regulation has been paralleled by an increase in the complexity of many resource management and conservation issues. Modern technology, for example, has given rise to a vast proliferation in the number of chemicals that potentially can pollute soil, water, and air resources. The possible adverse health effects from toxic chemicals are numerous. Also, the social and economic factors surrounding chemical pollution and its removal are very complicated. One result of this increased complexity is that a knowledge of the ways in which natural, physical, and human environmental systems operate is not really enough for a person to become an effective resource manager. In addition, one has to learn how these systems operate together. Put another way, many arts and science graduates of our universities and colleges are not entirely prepared for the difficulties and realities of modern resource management and conservation. The situation may be illustrated further if we look at the plight of a fictitious character who we might call David Rogers.

David Rogers has worked for the State Department of Natural Resources for five years. When he first arrived fresh

from college he was “really keen on preserving the environment.” Today, like most days, David will check the details given to the department by a company that wishes to open a quarry two hundred miles away from where he works, in a part of the state he has never visited. No less than eleven forms have to be checked and cross-checked against the thresholds and limits of three state environmental laws. All this is required for just one permit application, and David tries to keep from looking at the thirteen other applications in his in-tray, awaiting his attention.

David is a week overdue in giving a report to his superior on how a part of one of the required forms could be clarified. He has been assigned to represent the department at a local proposed wastewater treatment plant hearing, which he will attend tomorrow, but he has been warned to say as little as possible in case of potential embarrassment to the department. David’s superior enters carrying two large red-bound volumes, and both men know what they are—the research and development plan from the Federal Department of Energy for the intensive development of the coal resources in the southeast part of the state. “Friday—” David’s boss calls out over his shoulder as he departs hurriedly. They have been expecting this rush. All 732 pages have to be reviewed, with written comments passed along to the governor by Friday. Today is Tuesday. Things are normal in the office. David looks up at his fading Sierra Club poster on the wall and lets out a big sigh.

There are literally thousands of David Rogers—individuals who are engulfed in the mechanics of day-to-day environmental problems. For these people there is little time to step back and think. College doesn’t really prepare them for this. The lofty quotes of Aldo Leopold seem very distant. There always seems to be too much to do, and resource managers and conservationists commonly find almost overwhelming demands on their time and energy. There are several pragmatic strategies that might be employed to deal with such a situation. One could do things in order as they appear on one’s desk. One could do things in the order in which they are needed in time. One could make a priority list and start working through it. None of these approaches necessarily leads to effective resource management and conservation. And neither does the approach suggested here; but we feel that it stands a better chance of resulting in at least a more systematic treatment of resource management and conservation problems.

The approach advanced in this book is to establish a series of guidelines for resource management and conservation. An example of such a guideline would be that an inventory and evaluation of the resource in question must be made. Then the harassed

resource manager could use the guidelines as a kind of checklist, rephrasing them in the form of questions and applied to the particular resource management or conservation issue that is being addressed. Thus, for example, David Rogers, in dealing with an application for a mining permit, could ask himself, "Has there been made an adequate inventory and evaluation of the mineral resource to be mined, as well as other related resources that may be impacted, such as wildlife?" It would take only a short time to go through the checklist—just the time taken to travel in the bus to the wastewater plant hearing, for example. But it would help to ensure that all parts of a particular issue have been considered, even if they have not been addressed in a comprehensive and exhaustive manner.

This book is organized so that the particular guidelines for the resource manager's checklist are developed first. Then they are applied to four resources—those of soil, land, water, and air. These are all renewable resources, at least in some sense. They are chosen because they illustrate the need for most of the guidelines as well as would nonrenewable or other renewable resources, and also because the latter are considered in a companion volume from the Charles E. Merrill Publishing Company, entitled *Earth Resources, Energy, and the Environment*, by Douglas G. Brookins.

Before developing the guidelines, it is necessary to clarify what is meant here by resource management and conservation. In addition, a brief look at the history of these subjects—especially recent history—should help the reader understand the pragmatic emphasis of this work. The guidelines manifest this emphasis, but it is underscored further in this part by a discussion of the role of various socioeconomic systems in relation to resource management and conservation. Indeed, this discussion is designed to show how important it is for individuals working in this field to have some guidelines to help steer them through what is essentially the quagmire of reality.

Let us start with some definitions. A *resource* is something that can be used for support of human life and improve its quality. It can be something as tangible as the soil that provides nutrition for a wheat crop, or it can be as intangible as a beautiful view of the Piedmont of Georgia (Figure 1-1). One of the guidelines to be developed later deals with the wide variety of resources and the necessity of understanding the type of resource in order to manage it efficiently. *Resource management* is the controlled use of resources for the general good of humans. There are many aspects to management, with different management techniques often required for different resources. In general, resource management involves extending the life of the resource as much as possible, and although

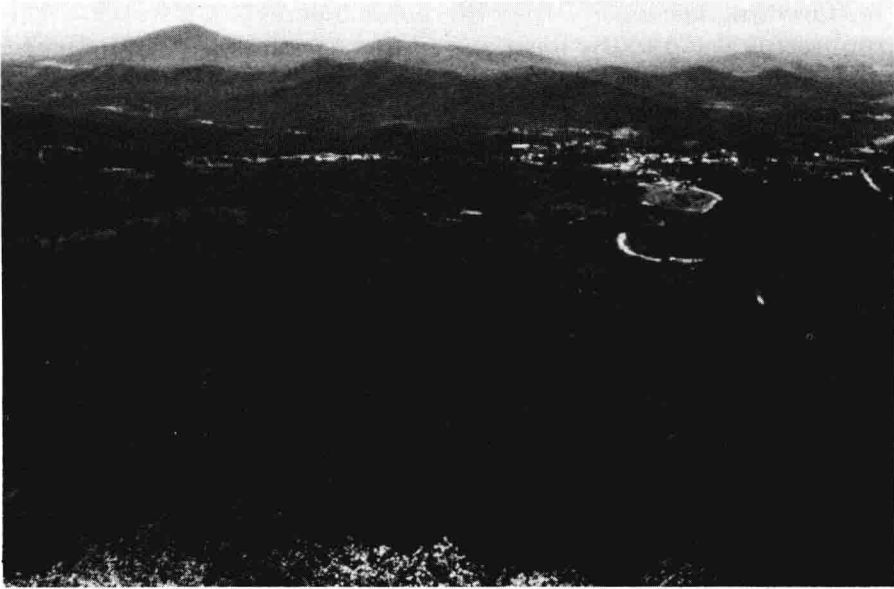


FIGURE 1-1

Views from high places are often inspirational and represent an intangible resource. This view is southward looking from Mount Yonah across the Piedmont of Georgia.

management techniques might differ in detail from resource to resource, certain strategies are common to most cases of resource management. These include the need to evaluate the resource, to make objective decisions, and to take part in long-term planning and conservation practice. While most people think in terms of managing our more obvious resources (such as the physical elements considered in these pages), or more directly, food and energy resources, others would argue that the management of our aesthetic resources is also extremely important. Michael Treshow has argued strongly that "nature in our daily lives may well be an inherent biological necessity, not a luxury. Millions of years of inheritance and culture have programmed us to a natural habitat of fresh air and a varied wild landscape unspoiled by the perturbations of civilization."¹

An important part of resource management is conservation. *Conservation* is a way of looking at the world based on an understanding of physical and biotic systems (including human, social, and economic) such that options in the use of resources of all kinds are kept open, and an attempt is made to reach a state of harmony among all systems.

It is easier to see the relationship between resource management and conservation if a brief recent history of environ-

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mental thought in the United States is sketched. Such a history encapsulates two major themes: First there is that of trying to establish a balance between humans and nature, as first suggested in the 1860s by George Perkins Marsh. Second, there is the idea of simultaneously using and husbanding resources, as typified by the efforts and directives of Gifford Pinchot, the first head of the U.S. Forest Service (Figure 1-2).



FIGURE 1-2

Gifford Pinchot was a leader of the conservation movement and the first director of the U.S. Forest Service. (Forest Service USDA Photo)

The first theme, that of harmony, has both an emotional and a scientific appeal. The very title of Marsh's famous book, *Man and Nature; or Physical Geography as Modified by Human Action*, suggests these two appeals. Furthermore, the writings of some of the outstanding advocates of this theme, such as John Muir and Aldo Leopold, show that the authors are not only passionately in love with the earth, but that they have a sound scientific base to accompany their affection. For example, we have Leopold's frequently quoted words from *A Sand County Almanac*: "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

Until the Second World War the theme of harmony was best advanced by individuals such as those mentioned above. In the last few decades this theme has been nurtured more by groups and

institutions. Notable names are the Sierra Club and the Audubon Society. The individual's experience of nature has not changed, but society's view of nature and conservation appears to have become more institutionalized. In addition, due to the increasing threat to our natural environment, adherents to the theme of harmony have closed ranks and become more polarized. Today they form an identifiable body in the matrix of environmental concerns.

The theme of using and husbanding the land is more often associated with government—especially the federal government. Oliver Owen has summarized events in this theme as occurring in three waves.² The first was initiated in 1908, with President Theodore Roosevelt's call for a White House Conference on Natural Resources. This conference led to the formation of the National Conservation Commission (headed by Gifford Pinchot), forty-one state conservation agencies, a natural resource inventory, and large areas of land being earmarked for "reserves," or national forests.

A second period is associated with the name Franklin D. Roosevelt, whose administration lasted from 1933 to 1945. During this time the Public Works Administration was established, which was responsible for many resource conservation projects, such as massive shelterbelt development. The National Resources Board was formed and made a second resource inventory. The Civilian Conservation Corps was responsible for many projects in national parks and forests. The Soil Conservation Service grew out of the Soil Erosion Service. The integrated conservation experiment of the Tennessee Valley Authority was begun (Figure 1-3). The first North American Wildlife and Resources Conference was held in 1936, and the Wildlife Restoration Act was passed in 1937. Winston Churchill once said that meeting Roosevelt was "like opening a bottle of champagne." In retrospect, many conservationists might feel the same way.

President John Kennedy has been credited with the commencement of a third period of conservation emphasis; to be exact, the White House Conference of Conservationists in 1962. During this period, which lasted well into the 1970s, the federal government responded to the national growing concern about the environment that was suffering from the pressures of technology and population growth. Rice Odell believes that the environmental revolution of this period was inevitable. "Population was growing inexorably; pollution was increasing dangerously; land was being desecrated relentlessly. At some point these excesses were bound to reach the limits of political endurance."³ The result was a spate of federal and state legislation. Far-reaching environmental laws were passed, such as acts dealing with air and water quality, and in particular, the National Environmental Policy Act of 1969. A further milestone was

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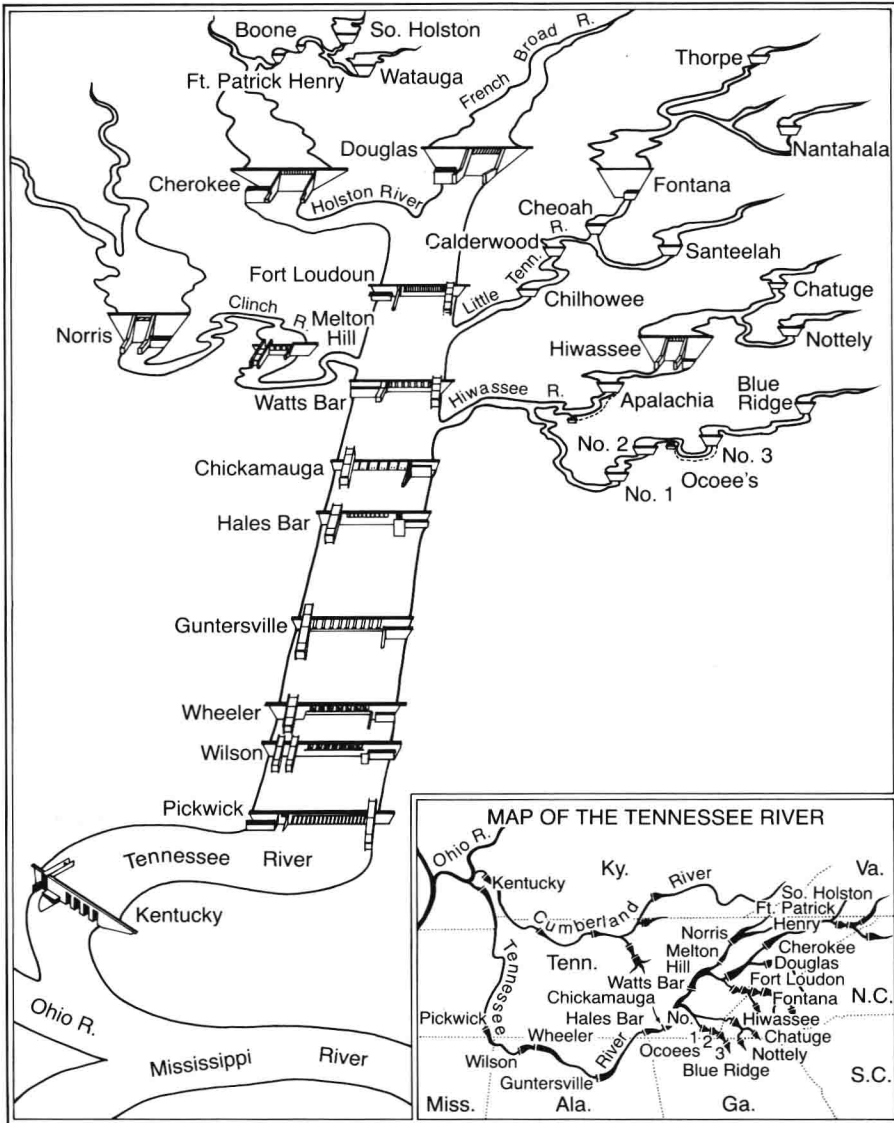


FIGURE 1-3

The water control system of the Tennessee Valley Authority is an example of an integrated conservation experiment.
 (Courtesy Tennessee Valley Authority)

the formation of the Environmental Protection Agency. Even when the height of public environmental awareness had passed, the environmental laws were still in effect. Consequently, a major feature of

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environmental and conservation history of the late 1970s and early 1980s is the process of industry's and society's learning to live with what probably are the most comprehensive environmental laws on earth. Table 1-1 lists some of the more important of these laws now current in the United States.

TABLE 1-1 Major federal environmental legislation

Fish and Wildlife Coordination Act, 1934
Atomic Energy Act, 1954
Multiple-Use Sustained Yield Act, 1960
Wilderness Act, 1964
National Environmental Protection Act, 1969
Marine Protection, Research and Sanctuaries Act, 1972
Coastal Zone Management Act, 1972
Renewable Resources Planning Act, 1974
Endangered Species Act, 1973
National Parks and Recreation Act, 1978
Safe Drinking Water Act, 1974
Federal Insecticide, Fungicide and Rodenticide Act Amendments, 1975
Toxic Substances Control Act, 1976
Resource Conservation and Recovery Act, 1976
Federal Land Policy and Management Act, 1976
National Forest Management Act, 1976
Clean Air Act Amendments, 1977
Clean Water Act, 1977
Surface Mining Control and Reclamation Act, 1977

Specific environmental laws and regulations are just part of the total political and legal system of the United States against which resource management and conservation issues are played out. The same issues are also embedded within the economic system. But before pursuing this let us consider some aspects of the political and legal systems.

The Political and Legal Systems

Ever since the evolution of the Constitution of the United States in 1787, the political and legal systems have been intertwined. As every American schoolchild is taught, the Constitution was designed to prevent any single group from gaining absolute power through use of a system of checks and balances, set up among the legislative, executive, and judicial branches of government. Each of these three branches is checked by one or two of the others, so that lawmakers (the politicians) on the one hand, and the law interpreters (the legal

profession) on the other hand are two sides of the same coin. They are a reflection of the way in which society organizes itself and are an absolute necessity in making an economic system function.

Among many aspects of the country's political and legal systems, two are singled out here for their particular relevance to resource management and conservation. The first is the fragmentation—especially of the political system. The second is the after-the-fact and piecemeal nature of the legal system.

At the initial Constitutional Convention in the Philadelphia State House in the late eighteenth century, practically all of the delegates represented the great property interests of the country. Property interests are best guarded by a strong central government, which is what these delegates wanted and got. Yet, at the same time, there was apparent potential conflict between central and local government—in this case, state government. This inevitable conflict no doubt was extended then, as it is today, to occur also between state and local county and city governments. Conflict also arises because of differences between different areas. Interstate differences and interests are frequently found in Washington. Even individual state representatives sometimes say they see a specific problem differently when they are in Washington, compared to when they are in their home state. Within the context of resource management and conservation, the nature of this conflict has assumed varying degrees of overtness or covertness throughout history. Possibly it was least noticeable in the 1930s when central government was going to great lengths to help local areas. Apart from the conservation measures that were taking place then, there were many other things that touched the individual.⁴ Unfortunately, much of the federal environmental legislation that arose from the environmental movement of the 1960s and 1970s has aggravated the potential conflict among the various levels of government. A case in point is the Clean Water Act Amendments of 1972 (with subsequent federal actions), perceived by many local governments as the federal government making a law and then doing everything in its power to prevent local governments from carrying it out. Part of this law provided federal funds for local governments to build wastewater treatment plants, but at the same time a large amount of bureaucracy resulted in a very slow implementation of the law.

Even without conflict among levels of government, the fragmentation of the total political system itself is often enough to forestall effective resource management and conservation. Alan Magazine has pointed out that "confusion revolves around how environmental responsibility is to be shared by the separate governmental entities."⁵ Frequently there are overlapping responsibilities and du-