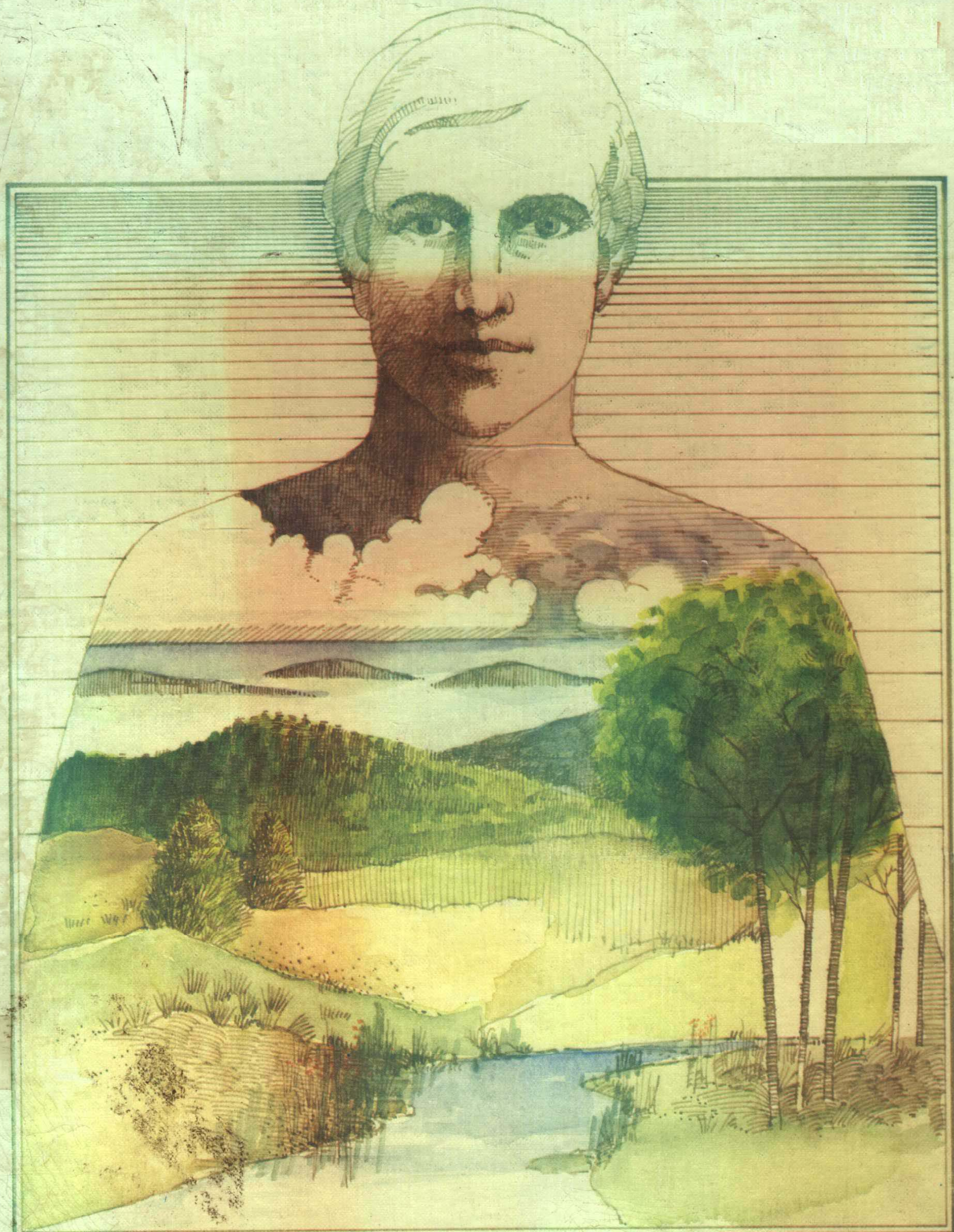
PLANTS, PEOPLE & ENVIRONMENT

Peter B. Kaufman and J. Donald LaCroix



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Preface

In our present-day civilization, we have witnessed an ever-accelerating rush toward overpopulation, exhaustion of our natural resources, and a gobbling up of our wilderness and natural areas by sprawling suburbs and agricultural and industrial enterprises. The awful consequences of this are documented daily. We are enmeshed in a synthetic environment, and people are being caught up in it where they work and where they live. Little wonder people are embarking on a new "green revolution"—one that embraces green spaces, plants in their homes, paintings and posters of nature, and gardens that may be no bigger than a windowbox! But we must seek other solutions—solutions on a much larger scale. These are necessary if we are to survive long enough to provide our children's children with a fit place in which to live.

Solutions to the crisis facing us today can be appreciated and understood only by obtaining a basic background in botany and ecology. Therefore, we have devoted an entire section of the book to plants and their way of life, and another section to probing the nature of our ecological environment. Our colleagues and students have suggested that we get right down to basic solutions of our environmental problems. Many books and articles have documented what the specific problems are, but few present practical, workable solutions.

We hope, after reading this book, that you will join us in our efforts to fight to conserve our natural heritage, to learn from nature, and to participate in working out solutions to our environmental crises. From such efforts, we can develop a more sane environment for all of us to live in, where people can be free from rubbish, fumes, and concrete jungles. We desperately need a new life-style in which we conserve our energy, use our plants more effectively, recycle our industrial products, and put the brakes on the population explosion. We hope that our book will provide a framework for such a life-style through its emphasis on plants, ecology, and solutions to all the many types of environmental problems confronting us today.

We would like to express our profound appreciation and thanks to the following people who helped in the preparation of this book: typing —Martha M. Jones, Karen White, and Suzanne Weller; photos and art work—Larry Mellichamp, David Bay, and Linda Kaufman; research work for preparation of the text—Kathy Rybarz, Steve Amatangelo,

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J. Donald LaCroix studied botany at Purdue University. His wide experience in research includes work as a Kellogg Fellow at the University of Michigan, a position as Research Associate with Argonne National Laboratories, and work in mycology with Parke Davis. He has authored over 20 articles for professional journals based on his interests in electron probe analysis of silicification patterns in plants and scanning electron microscopy. He is a member of several scientific organizations and presently is a Professor of Biology at the University of Detroit and a Research Associate in Botany at the University of Michigan.

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Contents

1 The Environmental Landscape—Untouched, Touched, and Retouched

Peter B. Kaufman

Questions for Consideration

1. How does one distinguish between a wilderness area and other types of natural areas? Why are wilderness areas important to set aside and preserve?
2. What are some of the ways in which we can live with nature instead of squandering and destroying our natural resources? What lessons can we learn from American Indians and other peoples?
3. What kinds of landscapes in our environment are being destroyed most rapidly today? What solutions must we invoke to prevent this needless destruction?

In this introduction to *Plants, People, and Environment,* we first need to see what has been happening to our natural environment. To do this, we shall explore some of our unspoiled environments or wilderness areas. Then we shall look at the multitude of ways in which people have been tampering with their environment. Finally, we look at ways in which people have, and are now, attempting to live with their natural environment. We hope that you will perceive that we have reached a crisis on this planet in the overutilization of natural resources, including energy; in overpopulating large areas of the world; and in polluting our environment to such an extent that in many industrialized societies, people suffer from chronic diseases and greatly increased death rates. All of these problems can be alleviated. It is the aim of this book to point out ways in which this can be done.

Unspoiled Environments or Wilderness Areas

We shall define a *wilderness area,* "in the ideal sense, as a large, primitive landscape in an otherwise essentially people-shaped environment. It is thus an extensive area of rugged, undeveloped land and water that, among other things, offers the opportunity for contemporary people to experience the challenges of a hostile, rugged, natural environment and opportunities for solitude or an escape from masses of people" (Paul Rasmussen, Michigan Department of Natural Resources).

On planet earth, the number of unspoiled, wilderness areas is diminishing rapidly. The pressure to set aside and dedicate those that remain has increased remarkably, especially with greater environmental awareness and education, and concerted action by environmental groups.

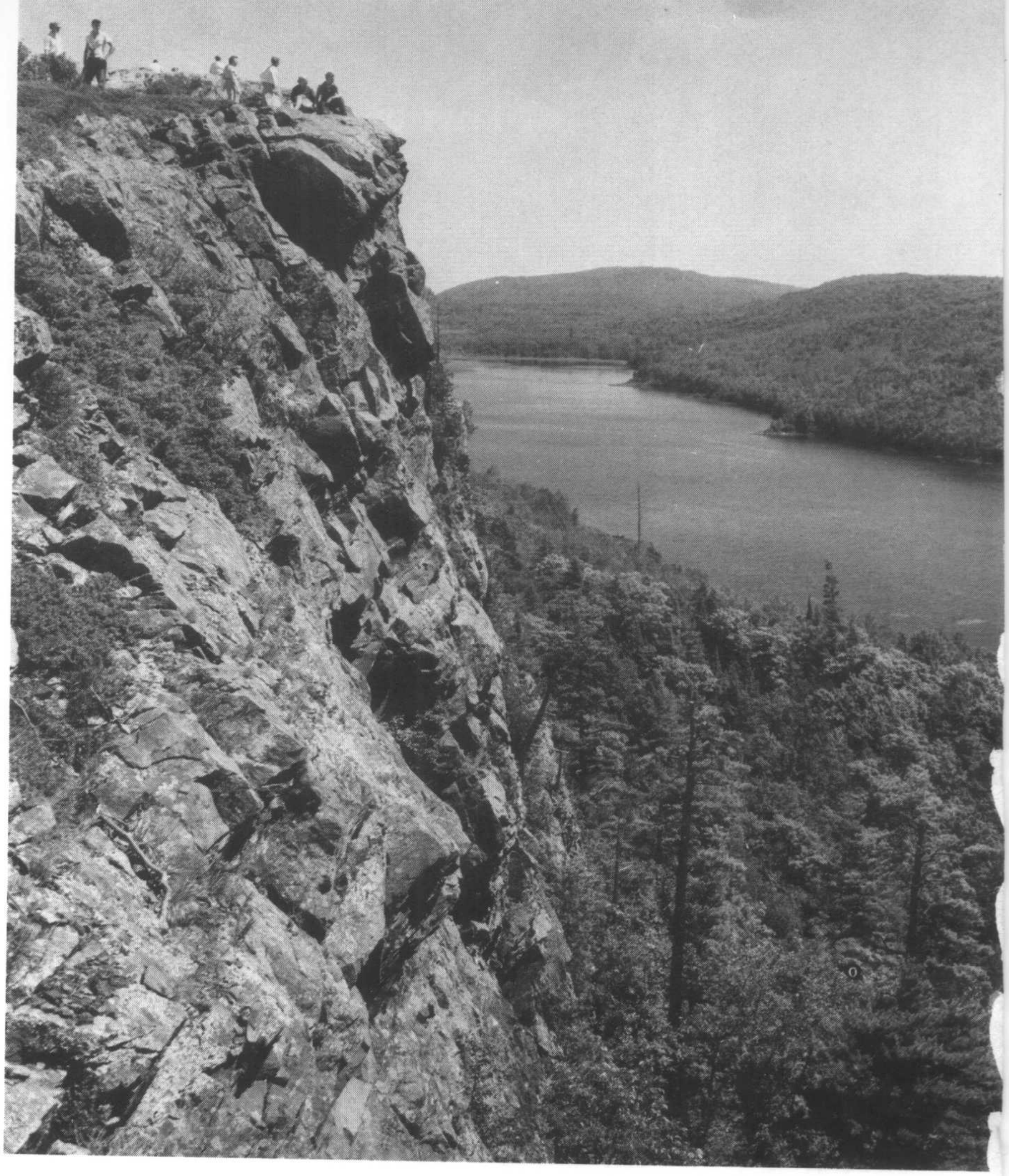


FIGURE 1-1.
View of the Lake of the Clouds and escarpment in the Porcupine Mountains State Wilderness Area of Michigan. (Courtesy of the Michigan Department of Natural Resources.)

One such area that has been set aside in Michigan is the Porcupine Mountains State Wilderness Area (Figures 1-1 to 1-3). Fortunately, this area was set aside in the 1930s, before it was logged off or intruded on to any extent by "development" interests. Other states have set aside equally beautiful wilderness areas.

It is essential to point out that attempts to set aside all types of natural areas as wilderness areas is neither feasible nor in agreement with the true wilderness concept, as defined above. Many natural areas set aside today include nonwilderness uses, such as nature interpretive centers, snowmobiling, marinas, dune buggies, vacation homes, villages, and scenic roads. Some environmentalists would like to "lock up" all such areas as "wilderness areas." As just pointed out, these types of human activities and structures completely violate the wilderness areas that are left in populous areas of the eastern United States, as well as those that are more vast and commonplace (but equally vulnerable) in the western United States.

FIGURE 1-2.
Aerial view of Mirror Lake in the Porcupine Mountains State Wilderness Area. (Courtesy of the Michigan Department of Natural Resources.)

Why is it important to save wilderness areas? Several salient reasons have been promulgated by various national and state conservation organizations. They include the following:

1. To do ecological research.
2. To preserve endangered species of plants and animals.
3. To maintain the "gene pool"—to have available species of plants that can be used for crop improvement or as a source of wild plants that can be used to breed new, more desirable plants for people's food, fiber, and enjoyment.
4. To provide an "escape" for people from the urban ghetto.
5. To obtain exercise, as in hiking (or backpacking), cross-country skiing, and horseback riding.
6. To pursue hobbies, such as mushroom hunting, photography, and observing birds and other animals.
7. To study nature education.

All these goals are vital to human physical and mental health. Wilderness areas give us a sense of "ecological therapy," just as gardening is a kind of "horticultural therapy." We predict that without wilderness areas, people will become completely estranged from nature, suffer many more physical and mental maladies, and will drown in their own synthetic quagmire.

How People Harm the Natural Environment

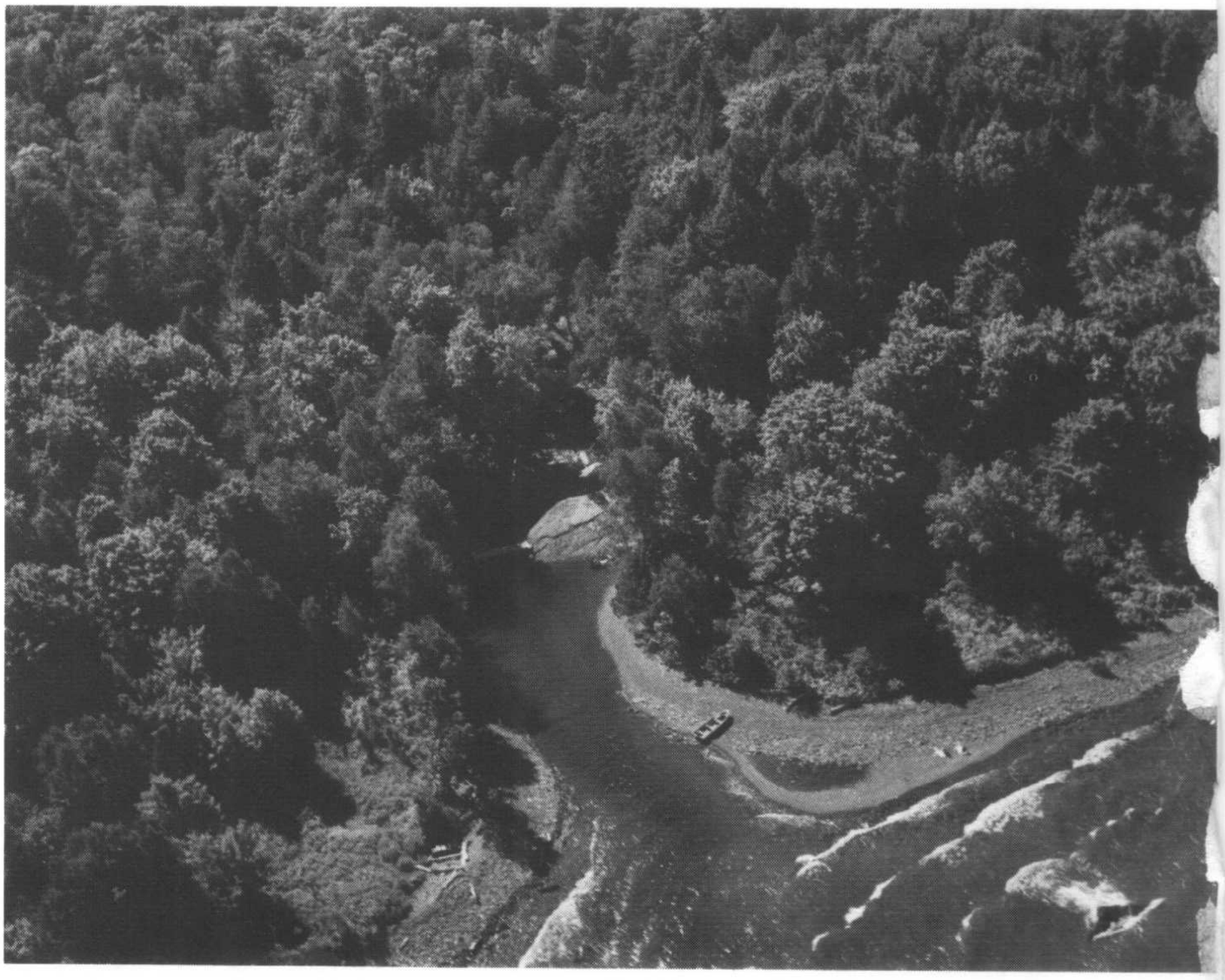
Ever since people have existed on this planet, they have, in all kinds of ways, with increasing frequency, been tampering with the environment. Let us look at some of the most dramatic cases.

1. *Man-made fires,* leading to the loss of timberland, as has occurred so dramatically in the California Sierra chaparral vegetation and in the once-magnificent forests of Douglas fir and other trees west of the Cascade Mountains in Oregon and Washington.

2. *Slash-and-burn agriculture in the tropical areas* throughout the world, leading to serious soil erosion and the loss of valuable cropland and natural wildlife habitats.

3. *Timber clearing and cutting* (especially clear-cutting), resulting in nearly complete loss of forests and wilderness areas. A good case in point is seen with relic tree stumps of white and red pine that once dominated

FIGURE 1-3.
Aerial view of the mouth of the Carp River in the Porcupine Mountains State Wilderness Area. (Courtesy of the Michigan Department of Natural Resources.)



central and northern lower and upper Michigan before the 1800s—all virtually logged off by early 1900.

4. *Mining minerals,* especially in the eastern United States, leading to ugly scars from strip-mining operations on hills and mountain slopes. In the western United States, many mines of the 1800s have left denuded areas that have *not* become revegetated to any great extent.

5. *Dumping of sewage and industrial wastes* into lakes, rivers, and oceans, leading to eutrophication of lakes (see Chapter 8), denuding of lakes and rivers of vegetation and animal life (e.g., Lake Erie, parts of the Rhine River), and hazards to human health from polluted drinking water (witness the dumping of takonite, containing asbestos fibers, into Lake Superior from an iron ore operation at Silver Bay, Minnesota).

6. *Intrusion of new modes of transportation and transportation systems into natural areas,* particularly new highways, snowmobile trails, motorcycle trails, dune-mobile areas.

7. *Devastation of the landscape by herbicides,* as has so clearly been documented for mangrove swamps and rubber plantations in South Vietnam through aerial application of herbicides such as 2,4,5-T and cacodylic acid.

8. *Scars upon the landscape as a result of conflict* between nations and tribes, as witnessed by huge bomb craters and relics of weapons left all over the landscape, both in aquatic and land habitats.

9. *Invasion of agricultural and natural areas by sprawling shopping centers and suburbs* at an ever-accelerating pace, especially because of the lack of land-use planning and adequate zoning restrictions.

10. *Introduction of pests into new areas,* including disease-causing bacteria and fungi, insect pests, and weeds (over 80 percent of the weeds in California have been introduced from other areas, particularly the Mediterranean).

11. *Overgrazing, coupled with drought,* especially dramatic in northern Africa, where there has been a tragic loss of vital food supplies for both humans and livestock.

12. *The pressure of people on the environment as a result of overpopulation,* especially in Japan, India, Mexico, and the eastern United States.

These are but a few of the ways by which people have been destroying our natural environment. Most of these are of major importance. Not all of these are irreversible; indeed, today we are witnessing a long-overdue attempt to prevent these types of destructive activities.

People's Attempt to Live with Nature: Restoration at Work

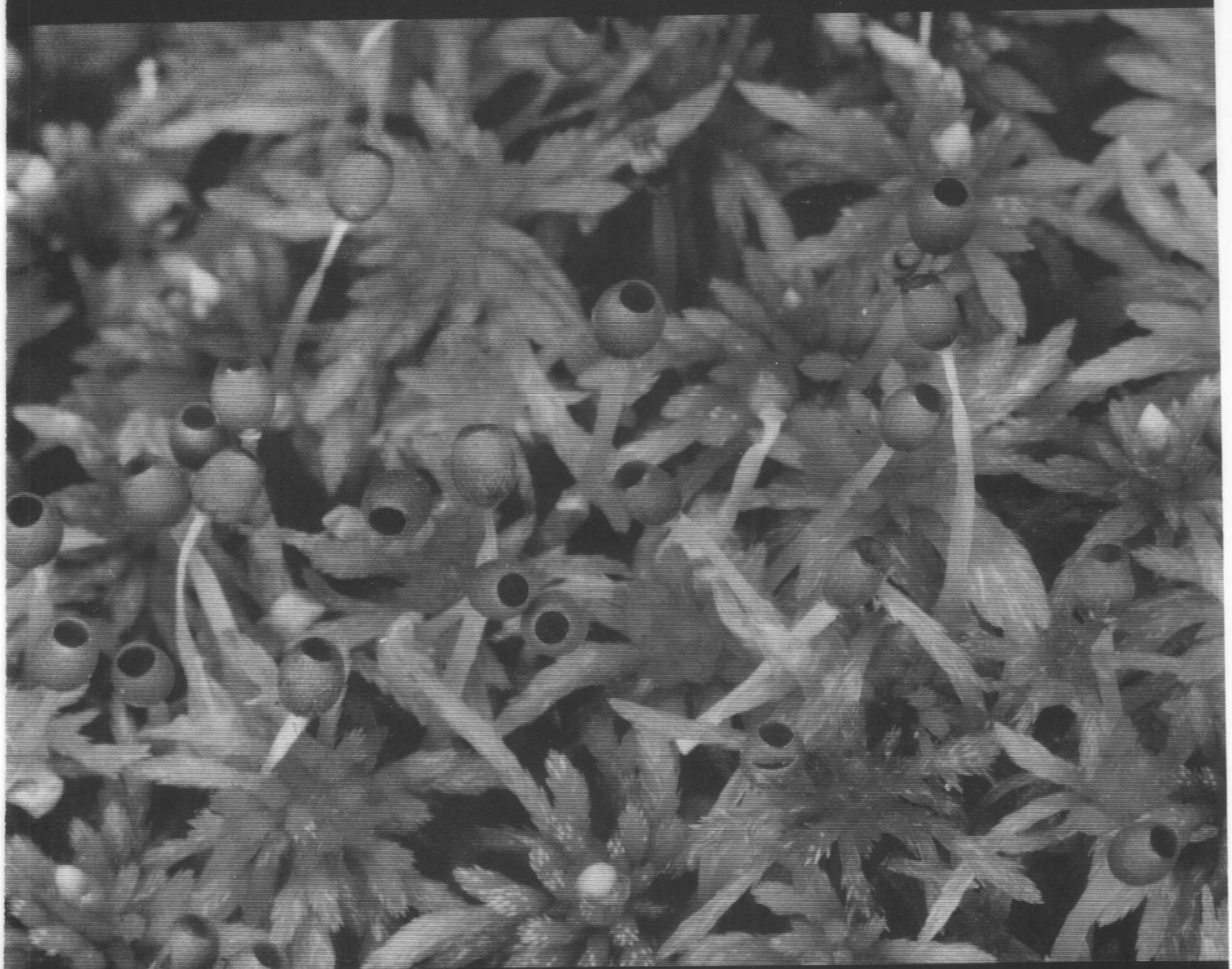
It is refreshing to see all the positive steps now under way in our country to correct many of our environmental disasters and wrongdoings. We shall go into these steps in more detail in later chapters, but for now, let us list a few of these:

1. Conservation of heat, food, fuel, water, timber, and other sources of energy.
2. Use of alternative energy sources, such as wind, geothermal, and solar energy.

3. Recycling of wastes: paper, glass, metal, tires, garbage, compost, chips, and sawdust.
4. Establishment of wilderness areas: greenbelts and parks in urban areas.
5. Enforced (by law) revegetation of strip-mined areas.
6. Establishment of land-use laws.
7. Population planning and control.
8. Use of wild, edible foods.
9. Establishment of nature centers and environmental education programs in our schools.
10. Curtailment of industrial pollution by law and imposition of stiff fines for violation of antipollution laws.
11. Use of alternative modes of transportation: mass transit, bicycles (and bicycle paths), cross-country skis; banning of ORVs (off-road vehicles) from wilderness areas.
12. Use of multiple-crop rotation systems to prevent erosion, add nutrients to the soil, and increase yields (as opposed to continuous monoculture systems).
13. Use of plants to improve environmental quality on streets, around city buildings and homes, and on school properties.

You should now get a glimpse of what this book will be about. We shall continually reiterate the central theme, that people *must live with* and *respect* their natural environment, much as American Indians have done in the New World, as cultures in India and China have done for centuries, and as environmentally concerned people in many countries are trying to do today. We have no other alternative, as we may find that we are on a collision course with nature if we continue in our destructive ways, magnified by an ever-burgeoning world population with ever-increasing numbers of mouths to feed.

SECTION *I*



Plants: Their Way of Life