The Vanishing Present
Counties of Wisconsin
The Vanishing Present:
Wisconsin’s Changing Lands, Waters, and Wildlife

Edited by Donald M. Waller and Thomas P. Rooney

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Contents

List of Contributors ix  
List of Illustrations xii  
List of Plates xiv

1  Assembling the Puzzle  
Donald M. Waller and Thomas P. Rooney

Part One: Perspectives

Introduction 15
2  The View from Man Mound 17  
Curt Meine
3  The Challenge of Unveiling the Invisible Present 31  
John J. Magnuson
4  Thinking Like a Flower: Phenology and Climate Change at the Leopold Shack 41  
Sarah D. Wright and Nina Leopold Bradley

Part Two: Changing Plant Communities

Introduction 57
5  Broad-Scale Change in the Northern Forests: From Past to Present 61  
David J. Mladenoff, Lisa A. Schulte, and Janine Bolliger
6 Plant Species Diversity in the Once and Future Northwoods
   Thomas P. Rooney and Donald M. Waller

7 From the Prairie-Forest Mosaic to the Forest: Dynamics of Southern Wisconsin Woodlands
   David Rogers, Thomas P. Rooney, and Rich Henderson

8 Savanna and Prairie: Requiem for the Past, Hope for the Future
   Mark K. Leach

9 Plant Communities of Great Lakes Islands
   Emmet J. Judziewicz

10 Patterns in Wisconsin Lichen Diversity
    James P. Bennett

11 How Have Wisconsin’s Lichen Communities Changed?
    Susan Will-Wolf and Matthew P. Nelsen

Part Three: Changing Waters and the Land-Water Interface

12 Great Lakes Ecosystems: Invasions, Food Web Dynamics, and the Challenge of Ecological Restoration
    James F. Kitchell and Greg G. Sass

13 Documenting and Halting Declines of Nongame Fishes in Southern Wisconsin
    David W. Marshall and John Lyons

14 Change in Wisconsin’s Coastal Wetlands
    Jim Meeker and Gary Fewless

15 Southern Wisconsin’s Herbaceous Wetlands: Their Recent History and Precarious Future
    Joy B. Zedler and Kenneth W. Potter

16 Shifting Plants in Wisconsin Lakes
    Stanley A. Nichols

17 Changes in the Wisconsin River and Its Floodplain
    Monica G. Turner, Emily H. Stanley, Matthias Bürgi, and David J. Mladenoff
Part Four: Changing Animal Communities

Introduction 253

18 Changes in Mammalian Carnivore Populations 257
Adrian P. Wydeven and Charles M. Pils

19 Deer as Both a Cause and Reflection of Ecological Change 273
Scott Craven and Timothy Van Deelen

20 Changes in Amphibian and Reptile Communities 287
Gary S. Casper

21 Two Centuries of Changes in Grassland Bird Populations and Their Habitats in Wisconsin 301
David W. Sample and Michael J. Mossman

22 Wisconsin’s Changing Bird Communities 331
Stanley A. Temple and John R. Cary

23 Changes in the Butterfly and Moth Fauna 339
Les Ferge


Introduction 353

24 Public Lands and Waters and Changes in Conservation 357
Mike Dombeck

25 Urbanization and Ecological Change in Milwaukee County 363
Lawrence A. Leitner, John H. Idzikowski, and Gary S. Casper

26 Ecological Footprints of Urbanization and Sprawl: Toward a City Ethic 381
Dave Cieslewicz

27 Influences of Policy, Planning, and Management on Ecological Change 391
Stephen M. Born
# Part Six: Trajectories

## Introduction

28 Seeking Adaptive Change in Wisconsin’s Ecosystems
   Stephen R. Carpenter

29 Forecasting Species Invasions in Wisconsin Lakes and Streams
   M. Jake Vander Zanden and Jeff T. Maxted

30 Nonnative Terrestrial Species Invasions
   S. Kelly Kearns

31 The Potential Futures of Wisconsin’s Forested Landscapes
   Robert M. Scheller and David J. Mladenoff

## Conclusion

32 The Big Picture
   Donald M. Waller

Glossary

List of Scientific Names

Index
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Illustrations

Frontispiece  Counties of Wisconsin
3.1  Lake Mendota in winter  32
3.2  Ice duration on Lake Mendota  33
3.3  Warming trends in the Northern Hemisphere  34
4.1  Phenological shifts  45
6.1  Complex causes and effects of diversity loss  82
7.1  Change in relative density and importance value  95
8.1  Soil carbon  107
9.1  Yew understory  118
9.2  Great Lakes barrens  119
9.3  Cobble glade  121
9.4  Pilot Island  122
10.1  Lichen species  130
10.2  Lichen collections  131
11.1  Varieties of lichens  136
11.2  Locations of lichen studies  139
11.3  Lichen diversity  142
11.4  Change in lichens  144
12.1  Abundance plot of smelt, herring, and lake trout  160
12.2  Abundance plot of alewife, bloater, and salmonids  161
13.1  Changes in small stream fish  173
13.2  Changes in lake shoreline fish  175
13.3  Habitat preference for sunfishes  176
15.1  Changes at Buena Vista  197
16.1  Wisconsin ecoregions  213
16.2 Lake plant species numbers 215
16.3 Lake plant floristic quality 216
17.1 Wisconsin River and geographic provinces 230
17.2 Land cover in 1938 and 1992 233
17.3 Dams and river flow hydrographs 236
17.4 Nitrate in the Wisconsin River watershed 237
17.5 Tree genera along the Wisconsin River 239
17.6 Change in the proportions of maple and oak 240
20.1 Losses of reptiles and amphibians from Milwaukee 294
21.1 Changes in grassland and crop coverage 304
21.2 Greater prairie-chicken range expansion and contraction 309
21.3 Population trend for western meadowlark and dickcissel 315
21.4 Population trend for eastern meadowlark and two sparrows 316
25.1 Menomonee River estuary 365
25.2 Percent of plant species lost from Milwaukee 368
25.3 Plant, bird, and herptile species losses in Milwaukee 370
26.1 Development patterns and environmental impacts 385
28.1 Attainable regimes of a social-ecological system 411
28.2 Location of the Northern Highlands Lake District 413
28.3 Potential development scenarios 415
29.1 Three stages of invasion 425
29.2 Distribution of zebra mussel, rainbow smelt, and common carp 427
29.3 Expansion of rusty crayfish 428
29.4 Lake calcium concentration graph 429
29.5 Effects of common carp 432
Plates

Following page 210

1 Physiographic regions and glacial landscape of Wisconsin
2 Soils, temperature, and precipitation
3 Pre-European settlement vegetation in the Great Lakes States
4 Land cover change in Wisconsin
5 Presettlement forests of Wisconsin
6 Changes in abundance of eastern hemlock
7 Changes in abundance of aspen
8 Changes in housing densities
9 Oak savanna
10 Deer impacts
11 Northwoods wildness
12 Endangered and extinct lichens
13 Tufted orange bush lichen
14 Coastal wetlands
15 Undeveloped lake shoreline
16 Projected impacts of climate change
Thank you, reader. Arriving here suggests that you have a serious interest in Wisconsin’s lands, waters, and wildlife. I might also guess that you enjoy spending time outside; know something about birds, trout, or ferns; and care about how nature is faring in the 21st century. I hope you enjoyed learning more about the familiar and obscure corners of the state and its biota. You may have taken particular delight in learning something new about a species that lives here, its interactions with other species and its environment, or the more or less natural areas it calls home. If you are now more aware of and interested in Wisconsin species and habitats and how they have changed, this book has been a success.

Science, like other fields, rewards specialization. The individual chapters of this book reflect that specialization as scientists share with you their insights from years of field work and data analysis. Although we scientists and passionate amateurs know a great deal about our own favorite system or group of organisms, we don’t always take the opportunity to learn about parallel changes in other systems. We may also hesitate to ponder what these changes might collectively imply about the nature and extent of regional ecological change or how to apply this knowledge to better protect nature.
The authors of the science chapters share their fascination with natural history and ecological history by exploring what we know about a group of species or habitats. A few historians and policy experts add their insights to complete these stories and explore their social context. These stories are rich, interesting, and important, and perhaps these individual stories justify this book. However, the real value of the book you hold lies in the more complete picture of ecological change that emerges collectively from our individual accounts. Understanding that each of us held individual “pieces of the puzzle,” we sought to assemble our fragmentary stories into a broader narrative so that readers could understand their cumulative significance. As noted in chapter 1, our knowledge will always be incomplete, as many pieces of the puzzle are missing or disconnected from the rest. Nevertheless, we have enough information to see the big picture and its implications. Public discussions and decision making, however, often fail to recognize these overall patterns of ecological change and their long-term implications. We therefore sought to share our results broadly by writing not only for other scientists but also for teachers, students, policy makers, natural resource professionals, and interested citizens. This book represents the first time so many specialists have shared their collective knowledge about the causes and implications of ecological change for one region. It is unlikely to be the last.

This book focuses on assessing and interpreting the past century and a half of ecological change in the specific context of one state—Wisconsin. Ecological history tends to be particular to its geographic context. If we had written a book about the Great Plains or intermountain West, for example, you would find far more about the role of fire. The book benefits, however, from the landscape approach many chapters take to ecology as well as our regional strength in ecological history. We particularly benefit by inheriting such exceptional baseline information, allowing us to infer particular kinds of ecological change with precision. These rich historical data sets help us lift the veils on Magnuson’s (1990) “invisible present” in a way that is difficult or impossible elsewhere.

Bringing knowledge on these regional patterns of ecological change to light addresses several goals. Increasing the reader’s wonder and appreciation for species, natural systems, and the many ecological services they provide is always worthwhile. Wonder and appreciation, in turn, can inspire understanding and concern. Readers of this book are alert to the several factors that individually and collectively threaten the persistence of native species and the habitats they depend on. Such knowledge is critical for translating our concern for species and ecosystems into actions that can serve to sustain the beauty, diversity, and ecological integrity of
our lands, waters, and wildlife into future centuries. The most significant problem facing modern humans, as Aldo Leopold (1966) noted, is how to live upon the land without destroying its capability to sustain life.

**What Makes Wisconsin Unique?**

Wisconsin is not home to dense, tropical forests, coral reefs, or alpine meadows. We have few endemic species and few threatened or endangered species. Nevertheless, Wisconsinites take justifiable pride in their state’s unique history, qualities, natural beauty, and wild areas and use these to promote tourism.

What gives Wisconsin its particular ecological context and history? Those who live and work in Wisconsin sense its unique qualities. Wisconsin lies in the northern heart of North America where once the great western prairies merged into the savannas, forests, and wetland habitats of the eastern United States. Its residents know both the subzero blasts of arctic air in the winter and the rapidly advancing squall lines that spawn summer thunderstorms and tornadoes.

Our state lies between the Mississippi River and the Great Lakes, taking its name from the great river that bisects its length. “Wisconsin” derives from the French word “Ouisconsin,” translated perhaps from an Ojibwa word referring to a “red-stone place” along the river or a general gathering of the waters, used first to refer to the river and later to the territory around it. Water defines the state in more ways than its boundaries. We have such abundant surface and groundwater that then governor L. S. Dreyfus once seriously proposed that Wisconsin should build a pipeline to the arid Southwest and become the OPEC for water.

The Indian tribes that migrated into Wisconsin over the centuries before and after European settlement were attracted by the food, fiber, and shelter they found in its forests, grasslands, and wetlands. They fished for sturgeon, walleye, trout, bass, and whitefish. They hunted elk and bison in the prairies and savannas, white-tailed deer in the forests, and moose and caribou in the north. The Ojibwa were particularly drawn to “manomin,” the wild rice beds lining sloughs and clear lakes throughout Wisconsin. Wetlands also gave the Indians tubers from arrowhead and cattails and great flocks of geese and ducks to hunt. They felled large paper birches and stripped their bark to build light and maneuverable canoes. The mound-building Indian culture that thrived along the Mississippi and Wisconsin rivers cultivated fields of squash, beans, and maize.

Wisconsin also gave sustenance, fiber, and shelter to the early European settlers drawn to the region, though these took radically different
forms. French voyageurs spread out over the region to trap fur-bearing animals and trade with the Indians for pelts. Paul Bunyan era loggers came for logs from the giant white and red pines to float down the rivers to sawmills with spring floods. The loggers’ cooks clearly relished the nearby abundance of game. Demand for hemlock bark to tan hides and timber to build barns, houses, and the growing city of Chicago and a proliferating railroad network soon leveled old-growth forests, leaving burning slash and expanses of open land soon colonized by young aspen and birch. Aspen remains the primary source of pulp for the paper from mills on the Wisconsin and Fox rivers. Open lands and John Deere’s steel plow brought successive waves of farmers, whose efforts transformed the state’s prairies and savannas into the rural agricultural landscapes we see today. Many cows now graze the rich pastures of the dairy state where bison and elk once roamed. The rich soil built up by centuries of prairie plants now support large fields of genetically improved soybeans and corn with yields far higher than any Indian or early settler could have imagined.

The rapid transformation of Wisconsin’s landscapes in the late 19th and early 20th century left few huge pines and only scraps of native prairie or old-growth forest. The elk and herds of bison are gone as are the wolverines and cougars that used to hunt here. These species survive elsewhere and might one day return. Passenger pigeons, however, never will again darken our skies for hours or days at a time. Extinction is forever. Witnessing such rapid ecological devastation may have spawned the conservation ethic that took root in Wisconsin. John Muir’s boyhood in Portage, college experiences in Madison, forest work in Ontario, and industrial work in Indianapolis spurred a lifetime of exploration, scientific essays on glacial geomorphology, and an inspiring commitment to protect wild spaces in nature. We now associate his name with redwood groves in California, the movement to establish national parks, and the Sierra Club.

Half a century later, Aldo Leopold traced a curiously antisymmetric route that began in Dubuque, moved east, and then west before settling in Wisconsin. We remember Leopold, like Muir, for his lyrical writing, contributions to science, and fierce dedication to conserving land and wildlife. He virtually founded the field of professional game (later wildlife) management, urged strict protection for threatened species, and worked to establish the nation’s first wilderness area. He was also a keen observer whose views grew with his experience. The man who had once eagerly joined in killing wild wolves to protect “game” later warned us about the dangers of overabundant deer and the need to protect predators. Sales of
A Sand County Almanac continue to climb 60 years after it was written, helping to support a family foundation dedicated to carrying on work in restoration ecology. The Wilderness Society he cofounded still fights to broaden protection for the wildlands he so loved and understood.

Wisconsin thus claims a proud tradition in conservation. This tradition extends beyond Muir and Leopold to the mid-20th century when John Curtis helped convince the state to establish the first state natural areas program in 1951. The man from Clear Lake, Gaylord Nelson, made path-breaking efforts to protect land and waters as governor, senator, and chair and counsel to the Wilderness Society. He played key roles in passing the 1964 Wilderness Act and the Scenic and Wild Rivers Act, in controlling phosphates and pesticides, and in establishing Earth Day in 1970. We honor his legacy via the Knowles-Nelson Stewardship Fund dedicated to acquiring and protecting public land. The state has also become a hotbed for conservation land trust activity.

What Makes Wisconsin Typical?

If Wisconsin is so special, you may be wondering, are all the results we report here just local and specific to Wisconsin? Sadly, Wisconsin is not unusual or exceptional in terms of the trends documented in this book. Despite the fact that all the places and examples in this book are local to one midwestern state, the patterns, trends, and threats that emerge are numbingly familiar. Problems here are problems everywhere. This was, in fact, a premise for this book. The ecological change we observe in Wisconsin serves as a synecdoche for ecological changes around the world.

Wetlands continue to be filled in for agriculture or development or are polluted by runoff here and around the world (Crumpacker et al. 1988). The declines in many native grassland and forest songbirds that we describe extend at least across temperate North America (Terborgh 1989). States across the continent are grappling with overabundant deer, as are parts of Europe and New Zealand (Côté et al. 2004). The diversity of wildflowers appears to be declining in most forests where anyone has monitored closely (Waller and Rooney 2004). Many state foresters cringe in fear at what gypsy moths, Asian long-horned beetles, emerald ash borers, and unknown future pest arthropods are doing and will do to their forests. State and regional networks have sprung up to track and fight a succession of weedy plant invasions. International commerce, roads, and vehicles accelerate these trends. Birds now die from West Nile virus halfway around the world from its source. A 2007 headline—“Deadly fish disease circulating through the Great Lakes”—announces the arrival
of viral hemorrhagic septicemia to Wisconsin. Expect more. As travel and commerce shrink our world, roads and suburbs proliferate, and agriculture intensifies, global invaders find easier paths and more suitable hosts and habitats. These, along with other abundant weedy species, continue to displace species with more specialized, particular, and local requirements. The result? Wisconsin, like the world, grows ever simpler and more homogenous. What we can perhaps say about Wisconsin is that we know more—and should therefore know better.

The Nature of Cumulative Effects

Many of the changes described in this book may seem minor, or local, perhaps reflecting temporary shifts in habitat conditions (like succession). Any change in one species or one location can hardly be deemed a trend. But as we assemble data from many species and many locations and return to resurvey these years later, a sharper, broader picture emerges. While our image remains fragmented, both encouraging and disturbing trends are evident. There is no doubt that sandhill crane populations are recovering steadily across much of the state. Wolf numbers continue to climb, particularly in northeastern Wisconsin, and surpassed 500 in 2007. Many forests in northern Wisconsin continue to mature, reestablishing forest communities that could eventually come to resemble those that cloaked these lands 200 years ago. Steady efforts have increased the amount of public land, the number of designated natural areas, and the acres dedicated to conserving natural values under private efforts. We are also gaining scientific expertise and public enthusiasm for restoring prairies, wetlands, and forests. Some also look forward to chaining these habitats together into larger, more biologically functional networks capable of supporting ungulates beyond deer and carnivores beyond raccoons.

Although these trends are encouraging, it is difficult to be optimistic about other parts of the big picture. Grassland birds and many forest interior songbirds continue to decline in abundance, as do butterfly, moth, and amphibian populations in many parts of the state. Deer continue to decimate wildflower populations as well as seedling populations of oak, pine, cedar, yellow birch, and hemlock. Even if the deer dilemma is addressed more effectively, reestablishing healthy populations of these species may take decades to centuries. Levels of atrazine in our wells and PCBs and mercury in our fish and wildlife are declining only slowly. Groundwater depletion, nutrient runoff, and road salt threaten too many streams and wetlands. Land use changes across the state reveal steady declines in natural habitats and a steady climb in roads, towns, and cities.
Like many biotic declines, the population and economic growth that drive landscape changes usually creep along at a steady rate in a manner that attracts little notice. Each incremental change seems minor, and we are all now used to these changes. Indeed, politicians and chambers of commerce urge us to pursue and celebrate this growth, boasting about the benefits it will bring. Those concerned about too much growth or growth in the wrong places are accused of being elitist, myopic, or antiprogress. Local skirmishes increasingly erupt, but city and rural zoning codes still view natural habitats as undeveloped real estate more often than valuable assets deserving protection. This will continue to be the case until we recognize the threats posed by cumulative environmental effects. Although ecology teaches limits to growth, many pursue a different gospel.

A theme in this book has been the creeping, cumulative nature of ecological change. Because most habitat and species losses occur slowly, most of us remain unaware of them. Those who are attuned tend to notice fewer flowers or birds in a favorite patch of woods, cloudier lakes, or the advancing fronts of invasive species. However, these changes often remain invisible to an increasingly plugged-in and urban population. More media attention is lavished on celebrity gossip than on bird and butterfly population trends. More and more of what we know about nature comes secondhand, from books, papers, and TV, rather than from what we experience directly. Natural habitats are becoming more distant and foreign to us. In his perceptive book, Richard Louv (2006) notes that on average, between 1970 and 1990, the area around the home where children can roam on their own shrunk to one-ninth of what it had been. As urban populations spend less time outside observing wild plants and animals directly, the danger grows that they will feel less connected and care less about wild places. Worse, the outdoors looms increasingly as a menace, harboring disease-carrying ticks, mosquitoes that might transmit West Nile virus, or dangerous people engaged in illicit activity. As children lose their connections to nature, they may also be losing creativity and forms of social interaction while increasing their risks of obesity and attention-deficit hyperactivity disorder. How many teenagers today would accept Aldo Leopold’s assertion that being able to watch a woodcock’s “sky-dance” is more important than being able to watch TV?

The Growing Importance of Ecological Monitoring

Ecologists from a variety of subdisciplines, using a variety of approaches, are focusing increased attention on general themes of ecological change (Vitousek et al. 1997). Although the public now pays considerable
attention to global climate change, ecological change represents a much broader class of events. These extend from local changes in physiological function and species composition to shifts in habitat structure and community composition to regional shifts in species ranges to widespread habitat destruction and shifting landscape dynamics. In addition, these ecological changes interact with increasing atmospheric concentrations of carbon dioxide and climate changes in known and unknown ways. Given the increasing number of these impacts, the prevalence of nonlinear effects in ecology, and the complexity of their interactions, we may soon face a mounting and confusing profusion of impacts including several of unanticipated size and direction.

Understanding these complex patterns of ecological change and accurately forecasting their effects on ecosystems will doubtless increase the significance of ecological monitoring in the future. In the near term, it seems assured that natural ecosystems will continue to suffer the effects of habitat fragmentation, invasive species, altered disturbance regimes, disrupted trophic dynamics, and climate change. As these stresses accumulate, losses of populations, species, and ecological functions will accelerate and interact. As natural systems grow more scarce, they will also grow more valuable, though tracking their direct and indirect economic value will remain challenging. At the same time, other resources will also be growing scarcer and costlier, maintaining or increasing pressure on natural areas. As accounting for and tracking the values of natural systems becomes increasingly important, we can expect to see the emergence of a new field we might call ecological accounting. Ecological accountants will pursue ever more accurate and inclusive methods to track the ecological benefits and costs of various actions.

The importance of ecological monitoring and accounting is already evident in the rapid increase in economic trading of greenhouse gas emissions and carbon credits. Here, the goals are to cut greenhouse gas emissions (often relatively easy to estimate) and increase the amount of carbon being sequestered either by ecosystems or via industrial processes. Carbon accounting is fast emerging as a vital subfield demanding both economic and ecological expertise. A key aspect of this accounting consists of understanding how different kinds of ecosystem (agricultural fields, grasslands, wetlands, and various kinds of forest) function to absorb or release greenhouse gases, both in the short term and over longer cycles of disturbance (and ultimately in response to ongoing climate change). Fire frequencies, the fate of coarse woody debris, belowground carbon dynamics, and microbial processes in soil and animal guts all assume much greater significance in this context, demanding corresponding increases
in research and monitoring activity. At the same time, the few existing baselines and monitoring programs will grow in value. The current dearth of reliable baseline data and active monitoring programs, however, will slow progress and reduce our certainty about carbon sources and sinks. Slowly, policy makers will come to appreciate the complexity of ecosystems and the need to include short- and long-term dynamics into their calculations as well as our uncertainty about these.

*Increasing Visibility*

Although we see frequent headlines now about global warming, habitat destruction, new emerging diseases, and invasive weeds, these stories usually emerge piecemeal, one at a time, disconnected from their broader ecological context. Sound bites rob these stories of their historical and landscape context. Such snippets reflect both the narrow, specialized way we conduct our research and the way important scientific advances are usually simplified by reporters to make their stories more “newsworthy.” It may also reflect the reticence of scientists who usually prefer doing research to speaking publicly on controversial issues.

Consider the lesson offered by the unfolding global warming story. Although concerns about greenhouse gases and global climate effects have existed for decades, it took a string of dramatic disasters and personal interest stories to really mobilize public interest and concern. The heat wave and drought across the United States in 1988, the Mississippi River floods (and outbreaks of enteric disease) of 1993, the lethal 2003 heat wave in Europe that felled thousands, and the devastating effects of Hurricane Katrina in 2005 all primed audiences for Al Gore’s 2006 book and movie, *An Inconvenient Truth*. Suddenly, stories about polar bears and polar ice cap melting were front and center, displacing stories on biodiversity and tropical deforestation. As in that case, initial predictions from scientists were dismissed as speculative, premature, fraught with error, or unrelated to human activities. As empirical evidence on shifts in climate started to build up, some argued that these were anecdotal, local, or temporary. These arguments routinely came from lobbyists for various industries or their hired experts who took advantage of the “invisible present.” Once the data became overwhelming, tactics switched, with the same voices arguing that changes should be slow and deliberate to allow time for more research and analysis lest the economic costs of our reforms be too high. In the 1990s, an interesting scientific structure emerged in the form of the Intergovernmental Panel on Climate Change. This group of some 1,500 experts on climate change and its causes and
effects was assembled to provide consensus statements to governments on the scope and severity of the problem. Its most recent report and the United Kingdom’s Stern Report also discuss the economic costs and potential benefits of various actions. We have here both a concrete example of how useful it can be to link scientific expertise to pressing environmental issues and how slow this process can be when the public is confused by a fog of conflicting statements.

As we become more aware of pervasive ecological changes, ecologists have also become more aware of the need to share their research results with the broader public and decision makers. This is what motivated this book and directed its format. These concerns are also spurring sweeping assessments of ecological conditions across the country and around the world, including the Millennium Ecosystem Assessment program and major reports from the Pew and Heinz foundations. They have also spurred the Ecological Society of America’s “Sustainable Biosphere Initiative and Ecological Visions Committee and Report” (Palmer et al. 2004). This report notes that ecologists will have to forge partnerships at scales and in forms they have not traditionally used and strongly advocates public information campaigns to raise awareness of ecological sustainability.

**Focusing on the Right Issues**

Global warming presents us with a double-edged sword. It is, on the one hand, an exceptional opportunity to alert a broad cross-section of society (and the politicians who follow) to the alarming plight of our planet and the necessity of taking strong action. The Big Message here is that humans have become a global force—a clear symptom that human growth has outstripped the capacity of Earth to sustain our species (certainly in the style we are accustomed to). Climate change thus presents a “bridge” issue to connect the public with to the broader set of ecological issues we confront. We have a golden opportunity to educate people about the large and complex web of environmental and ecological crises in which we are enmeshed and how these might be managed in an integrated and strategic manner. Most obviously, going “green” to reduce our greenhouse gas emissions could also reduce our collective ecological footprint in many other ways (e.g., by favoring cleaner, denser, and more livable cities; see chapter 26).

We also, however, face dangers if we focus attention only on climate change. While global warming clearly poses an immediate and dramatic threat to human well-being, it represents at least as large a threat to other
species living in increasingly isolated fragments of habitat. Just as we were once admonished to buy a hat and sunglasses to respond to ultraviolet exposure from ozone thinning, we should be leery of proposed “solutions” to global warming that focus only on saving humans. Environmentalism of the kind that focuses on threats to human comfort, well-being, and commerce ignores the cataclysmic threat that climate change and other human impacts pose to the biosphere. Buying more air conditioners, rerouting rivers, and shifting agricultural regions treats symptoms rather than causes. Thus we face the risk that proximal concerns about how global warming threatens humans will eclipse appropriate concerns for protecting habitats and other species. Our current crises demand deeper, more ecological, and more integrated approaches that focus on the core issues of human population growth and social and geographic patterns of overconsumption.

Human wants and needs show no signs of abating. We are not peculiar in this trait. No species in the history of life on Earth has ever evolved traits to limit its own acquisition of resources or reproductive output. On the contrary, natural selection favors individuals that acquire as many resources as possible and efficiently convert these into new progeny. Yet selection that makes sense on the individual level can be malignant at a higher level. Morality may have evolved to limit and guide human behavior so as to promote actions tied to collective success and limit behaviors harmful to our communities. As we gain a better view of how destructive our cumulative actions can be across landscapes and over time, can we also accept Leopold’s suggestion to extend our ethics to encompass the wider biotic systems that sustain us?

References


**Plate 1** The physiographic regions and glacial landscape of Wisconsin. (© D. Mladenoff. Maps in plates 1–8 by T. Sickley, Forest Landscape Ecology Lab, University of Wisconsin–Madison.)

**Plate 2** A generalized classification of Wisconsin, by soils, temperature, and precipitation. Classification is based on the combined influence of soils, temperature, and precipitation on susceptibility of habitats to fire and drought, as interpreted through the presence of forest understory plant species. (© D. Mladenoff, modified from S. Dahle, Wisconsin Department of Natural Resources.)
Plate 3 Pre-European settlement vegetation of the northern Great Lakes States. (Courtesy of U.S. Forest Service Great Lakes Assessment.)

Plate 4 Vegetation and land cover change in Wisconsin, from the mid-1800s to the 1990s. a, Generalized pre-European vegetation classes derived from U.S. Government Land Office Survey data (1832–65). (© D. Mladenoff.) b, Current generalized vegetation and land cover classes derived from Landsat satellite data (Data from Wisconsin Department of Natural Resources, Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data, 1996.)
Plate 5 Forest type classes, from U.S. Government Land Office Survey data (1832–65). (© D. Mladenoff.)

Plate 6 Changes in the distribution and abundance of eastern hemlock, from the mid-1800s to the 1990s. (© D. Mladenoff.)
**Plate 7** Changes in the distribution and abundance of aspen, from the mid-1800s to the 1990s (© D. Mladenoff.)

**Plate 8**

- **a** Number of houses per square mile, in 1940 (a) and 2000 (b). 
- **c** Percent housing density change, 1940–2000. (Data from V. Radeloff and R. Hammer, University of Wisconsin–Madison). 
- **d** Aerial photo showing sprawl on the land. (Photo by T. Rooney.)
Plate 9 A section of an oak savanna. Oak savanna once covered millions of acres in southern Wisconsin. Less than 0.01% of Wisconsin’s original oak savannas remain, making it one of the most endangered ecosystems in the United States. (Photo by T. Rooney.)

Plate 10 A deer exclosure. At high densities, large grazers like white-tailed deer have the potential to completely alter native plant communities. The fenced area, or deer exclosure, reveals how vegetation developed when protected from deer for 14 years. (Photo by T. Rooney.)

Plate 11 A human disturbance gradient throughout the Northwoods region. (Reprinted by permission from Natural Areas Journal 21[2001]:229–242.)
PLATE 12 Endangered and extinct lichens of Wisconsin. (Composite image courtesy of J. Bennett.)
Plate 13 The tufted orange bush lichen. This lichen occurs in oak savanna. Like its habitat, it is now very rare throughout the state. (Photo by T. Esslinger.)

Plate 14 Peshtigo Harbor (a) and Atkinson’s Marsh (b). Peshtigo Harbor is a relatively intact coastal wetland complex along Lake Michigan. Atkinson’s Marsh is an example of a degraded coastal wetland complex along Lake Michigan at the mouth of the Fox River. (Photos by G. Fewless.)
PLATE 15 An undeveloped lake shoreline in northern Wisconsin. Deadfalls, emergent and floating-leaved plants, and undeveloped shoreline provide critical habitat for many species of wildlife, including amphibians and nongame fish. (Photo by T. Rooney.)

PLATE 16 Projected impacts of climate change on Wisconsin forests. (Courtesy of R. Scheller.)