

# PREFACE

## THE ROLE OF ENVIRONMENTAL SCIENCE IN SOCIETY

We live in a time of great change and challenge. Our species is profoundly altering the Earth. Our use of fossil fuels to provide energy is altering climate, our use of Earth's soil resources to feed ourselves results in extinctions, overexploitation of fish populations has resulted in the population declines of many marine species, and freshwater resources are becoming scarce. At the same time we see significant improvement in other indicators. Energy-efficient and alternative energy technologies are becoming mainstream, population growth is beginning to slow, air and water pollution problems are being addressed in many parts of the world, and issues of biodiversity loss, climate change, and human health are beginning to be addressed on a worldwide basis.

However, there are still major challenges and there are additional opportunities to lighten our impact on Earth. Understanding the fundamental principles that describe how the Earth's systems work is necessary knowledge for everyone, not just scientists who study these systems. It is particularly important for political, industrial, and business leaders because the political, technical, and economic decisions they make affect the Earth.

## WHY “A STUDY OF INTERRELATIONSHIPS”?

Environmental science is an interdisciplinary field. Because environmental problems occur as a result of the interaction between humans and the natural world, we must include both scientific and social aspects when we seek solutions to environmental problems. Therefore, the central theme of this book is interrelatedness. It is important to have a historical perspective, to appreciate economic and political realities, to recognize the role of different social experiences and ethical backgrounds, and to integrate these with the science that describes the natural world and how we affect it. *Environmental Science: A Study of Interrelationships* incorporates all of these sources of information when discussing any environmental issue.

Environmental science is also a global science. While some environmental problems may be local in nature—pollution of a river, cutting down a forest, or changing the flow of a river for irrigation—other problems are truly global—climate change, overfishing of the oceans, or loss of biodiversity. In addition,

individual local events often add together to cause a worldwide problem—the actions of farmers in China or Africa can result in dust storms that affect the entire world, or the individual consumption of energy from fossil fuels increases carbon dioxide concentrations in the Earth's atmosphere. Therefore, another aspect of the interrelationships theme of this text is to purposely include features that highlight problems, issues, and solutions involving a variety of cultures.

This text has been translated and published in Spanish, Chinese, and Korean. Therefore, students in Santiago, Shanghai, Seoul, or Seattle are learning the “how's and why's” involved in thinking and acting sustainably. At the end of the day we all share the same air, water, and one not-so-big planet. It's important for all of us to make it last.

## WHAT MAKES THIS TEXT UNIQUE?

*We present a balanced view of issues, diligently avoiding personal biases and fashionable philosophies.*

It is not the purpose of this textbook to tell readers what to think. Rather, our goal is to provide access to information and the conceptual framework needed to understand complex issues so that readers can comprehend the nature of environmental problems and formulate their own views. Two features of the text encourage readers to think about issues and formulate their own thoughts:

- The **Issues & Analysis** feature at the end of each chapter looks at a particular environmental issue and highlights the complex social, political, and scientific interactions involved in dealing with the problem. It ends with a series of questions for students to consider.
- The **What's Your Take?** feature found in each chapter asks students to take a stand on a particular issue and develop arguments to support their position.

*We recognize that environmental problems are global in nature.*

Three features of the text support this concern:

- Throughout the text, the authors have made a point to use **examples** from around the world as well as those from North America.
- Many of the boxed readings—**Focus On; Going Green; Science, Politics, & Policy**; and **Issues & Analysis**—are selected to provide a global flavor to the basic discussion in the text.

- The presence of easily accessible **Foldout World Maps** at the back of the text allows students to quickly locate a country or region geographically.

*We recognize that many environmental issues involve complex social, economic, and cultural aspects.*

- The first three chapters focus on the underlying social, economic, health, and ethical aspects involved in understanding how people view environmental issues.
- The new **Science, Politics, & Policy** feature specifically addresses the issue of how scientific knowledge is used or ignored in the formation of policy.

*We recognize that it is important to focus on the positive.*

Environmental science often seems to focus on the negative, since one of the outcomes of any analysis of an environmental situation is to highlight problems and point out where change is needed. We often overlook the many positive actions of individuals and organizations. Therefore, each chapter has two features that call attention to the positive:

- **Going Green** boxes describe actions that are having a positive environmental impact. Some of these actions are taken by governments, some are by corporations, and some are individual efforts.
- **Thinking Green** is an end-of-chapter feature that asks students to consider making personal changes that are relatively simple and will have a positive environmental impact.

## NEW TO THIS EDITION

The thirteenth edition of *Environmental Science: A Study of Interrelationships* is the result of extensive analysis of the text and the evaluation of input from environmental science instructors who conscientiously reviewed chapters during the revision. We have used the constructive comments provided by these professionals in our continuing efforts to enhance the strengths of the text. The following is a list of global changes we have made, along with a description of significantly revised chapters. To see a more detailed list of chapter-by-chapter changes, please contact your McGraw-Hill sales representative.

**New Science, Politics, & Policy Feature** The scientific process leads to the discovery of facts and development of principles that describe how things work. Governments set policy based on social, political, economic, and scientific input. This feature is designed to show how these often conflicting agendas are involved in the ultimate production of policy.

**Current Content** As with previous editions the authors have incorporated the most recent information available at the time of publication.

**Revised Art Program** More than 100 new photos have been added or substituted throughout the text to depict real-life situations. Over 70 illustrations, graphs, and charts are new or revised to present detailed information in a form that is easier to comprehend than if that same material were presented in text form.

**Several Significantly Revised Chapters** Every chapter has a new Science, Politics, & Policy reading. In addition, many chapters have other significant changes, including:

**Chapter 1, Environmental Interrelationships** This chapter was substantially rewritten to serve as an introduction to emerging global issues. Particular attention is given to how the quality of the environment affects human well-being, health, and security. The effect of globalization on the environment is also introduced.

**Chapter 2, Environmental Ethics** This chapter has new or expanded coverage of “faith based” environmentalism and environmental justice. There is also new coverage on the concepts of “greenwashing” and the “triple bottom line.”

**Chapter 3, Environmental Risk: Economics, Assessment, and Management** There is expanded coverage of energy consumption and environmental economics, ecosystem services, and the economic value of nature in developing countries. There is an expanded discussion of cost-benefit analysis that uses hybrid cars as an example. The section on Economics, Environment, and Developing Nations was substantially rewritten.

**Chapter 5, Interactions: Environments and Organisms** The sections on the carbon cycle and nitrogen cycle have been modified to include a discussion of carbon and nitrogen sinks and how humans have altered the carbon and nitrogen cycle. There is a new Focus On feature that discusses whole ecosystem experiments.

**Chapter 7, Populations: Characteristics and Issues** The chapter was updated throughout with the latest human population data. There is a new section on genetic differences in the population characteristics section along with a figure showing the genetic difference between cinnamon-colored black bear and common black bear. The section on birthrate and death rate was rewritten.

**Chapter 8, Energy and Civilization: Patterns of Consumption** There are two new boxed readings: Going Green: Saving Energy at Home, and Focus On: China and India.

**Chapter 9, Nonrenewable Energy Sources** The chapter was updated with the most recent energy data on energy supply and consumption. Several reviewers have asked that the nuclear energy material be decreased and that renewable energy be placed in a separate chapter. Therefore, this chapter was reorganized to include aspects of nuclear energy as an energy source, and renewable energy sources are dealt with in a separate chapter 10. In addition, the sections on coal formation, the environmental issues related to the use of coal, and environmental issues related to oil use were substantially revised. The section on nuclear fission reactors has been rewritten and simplified and the section on the nuclear fuel cycle has new numbered subheads to make it easier to follow.

There is a new Issues & Analysis: Drilling for Oil in Deep Water.

**Chapter 10, Renewable Energy Sources** This is a new chapter that focuses on renewable energy sources. Consequently, there is a new section, The Status of Renewable Energy, that serves as an introduction to the topic. In addition, the sections on biomass fuels, hydroelectric power, photovoltaics, and energy conservation were rewritten.

**Chapter 11, Biodiversity Issues** There is expanded coverage on the value of natural support services along with a table of estimates of the value of various ecosystem services. There

is expanded coverage on globalization and how it encourages the spread of invasive alien species, with fire ants and European wasps used as examples. There is new discussion of the IUCN Red List of threatened species and the United Nations Convention on Biological Diversity.

**Chapter 12, Land-Use Planning** About half the content of this chapter has been rewritten. The primary goal was to simplify the organization of the chapter. This was done through a combination of creating new sections that consolidated content and reducing the number of subheads. There are three new tables and several new or modified illustrations that support the modified content. There are three new boxed readings dealing with urbanization in the developing world, using green building techniques in urban planning, and the possibility of urban farming in Detroit.

**Chapter 14, Agricultural Methods and Pest Management** Two sections, mechanized monoculture agriculture and alternatives to conventional agriculture, were substantially rewritten. There are also new boxed readings on feeding the world and sustainability and lawn care.

**Chapter 15, Water Management** There is a new section entitled The Global Water Challenge that highlights the concerns about a growing global water shortage. A new Going Green: From Toilet Water to Tap Water describes a way to conserve water by reusing it. Several topics have expanded coverage: chemicals in drinking water, the Ogallala aquifer, value of wetlands, how drinking water is priced, and the environmental effects of the aluminum waste spill in Hungary.

**Chapter 16, Air Quality Issues** This chapter was updated throughout with the latest data on air quality in the United States. The section, Addressing Climate Change, was substantially rewritten to reflect recent developments in this fast changing field.

**Chapter 17, Solid Waste Management and Disposal** There is expanded coverage of food waste, use of landfill gas for energy production, water pollution from landfills, and recycling programs. There is a new Focus On: Beverage Container Deposit-Refund Programs and a Science, Politics, & Policy: Dealing with e-Waste.

**Chapter 18, Environmental Regulations: Hazardous Substances and Wastes** With the reorganization of material on nuclear power, the material on nuclear waste was incorporated into this chapter. In addition, about half the content has been substantially rewritten. There is a new table that highlights the purpose of the various laws related to management of hazardous waste and a new figure illustrates the various documentation steps required by RCRA.

**Chapter 19, Environmental Policy and Decision Making** There is expanded coverage on the development of environmental policy with special attention to the role of congressional committees and lobbying in the development of environmental policy. There is a new Issues & Analysis that looks at the history of the EPA.

## ACKNOWLEDGMENTS

The creation of a textbook requires a dedicated team of professionals who provide guidance, criticism, and encouragement. It is also important to have open communication and dialogue to deal with the many issues that arise during the development and production of a text. Therefore, we would like to thank Sponsoring Editor Michelle Vogler; Developmental Editor Lori Bradshaw of S4Carlisle Publishing Services; Project Manager Kelly Heinrichs; Buyer Sandy Ludovissy; Photo Research Coordinator Lori Hancock; Designer Tara McDermott; and Media Project Manager Judi David for their suggestions and kindnesses. Finally, we'd like to thank our many colleagues who have reviewed all, or part, of *Environmental Science: A Study of Interrelationships*. Their valuable input has continued to shape this text and help it meet the needs of instructors around the world.

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