

**Cunningham: *Environmental Science: A Global Concern*
Tenth Edition Preface**

ENVIRONMENTAL SCIENCE HAS NEVER BEEN MORE IMPORTANT

We seem to have reached a turning point in environmental attitudes. A decade ago, few people took climate change seriously. Today, climate is a topic of headline news and political campaigns. Hundreds of colleges, communities, and local governments are working locally to reduce carbon emissions and improve efficiency. More than 400 bills have been passed in 40 states to require renewable energy. “Green” buildings are transforming architecture, and green business models are beginning to transform industry. The 2008 Summer Olympics in Beijing aims to be the greenest games ever with radical new strategies to conserve energy, water, and air quality. Most importantly, it’s not just environmentalists who are involved in efforts to protect and improve our environment; it is business leaders finding ways to reduce costs by reducing waste, insurance companies concerned about rising sea levels, and inner-city communities who are trying to lower asthma rates in children. Environmental science is increasingly understood to be a pragmatic field that helps us understand issues that affect our lives.

In the twenty-five years since we began work on this book, the United States and the world have undergone several cycles of concern and neglect for our global environment. We have seen growth, declines and a recent resurgence in public support for energy conservation, farmland protection, and environmental health. Global biodiversity, once a special interest of ecologists, is now an economic concern of drug companies and the global fishing industry. After years of purchasing ever-larger vehicles, Americans have recently found a renewed interest in automobile efficiency as we become increasingly aware of the costs of climate change—and of the political and economic costs of fighting to preserve our fossil fuel supplies. Major events like the Earth Summit in Rio de Janeiro in 1992 and the Kyoto conference on climate change in 1997 have raised awareness of how globally interconnected all of us are in terms of our environment, our economies, and our well-being. All these changes present new possibilities for building coalitions and finding new approaches to living sustainably. We hope this book will inform and inspire students as they consider their role in protecting our shared environment.

WHAT SETS THIS BOOK APART?

A positive viewpoint

We wrote this book because we think it’s important for students to realize the difference they can make in their community. We believe a book focused on gloom and decay provides little inspiration to students, and in this time of exciting change, we think such a gloomy view is inaccurate. Many environmental problems remain severe, but there have been many improvements over past decades including cleaner water and cleaner air for most Americans. The Kyoto protocol, despite its imperfections, is now pushing nations to reduce their climate impacts. The earth’s population exceeds 6 billion people, but birth rates have plummeted as education and health care for women have improved. This book highlights these developments and presents positive steps that individuals can take, while acknowledging the many challenges we face. Case studies that show successful projects, a new chapter on Restoration Ecology, and

“What can you do?” boxes are some of the features written to give students an applicable sense of direction. A number of other features also set this book apart.

An integrated, global perspective

Globalization spotlights the interconnectedness of environmental concerns, as well as economies. To remain competitive in a global economy, it is critical that we understand conditions in other countries and cultures. This book provides case studies and topics from regions around the world, as well as maps and data showing global issues. These examples also show the integration between environmental, social, and economic conditions at home and abroad.

A balanced presentation that encourages critical thinking

Environmental science often involves special interests, contradictory data, and conflicting interpretations of data. Throughout the text, one of the most important skills a student can learn is to think analytically and clearly about evidence, weigh the data, consider uncertainty, and skeptically evaluate the sources of information. We give students opportunities to practice critical thinking in brief “Think about it” boxes and in “What do you think?” readings. We present balanced evidence, while not suggesting that any opinion is on par with ideas accepted by the community of informed scientists and we provide the tools for students to discuss and form their own opinions.

Emphasis on science

Science is critical for understanding environmental change. We emphasize principals and methods of science through coverage on uncertainty and probability, new graphing exercises, data analysis exercises, and “Exploring Science” readings that show how scientists observe the world and gather data.

OVERVIEW OF CHANGES TO *ENVIRONMENTAL SCIENCE*, 10TH EDITION

What’s new to this edition?

The tenth edition includes marked changes in approach as well as a thorough update of topics and data. Among the important changes is an emphasis on positive lessons presented through recent events in environmental science. Also important are several new pedagogical features including data analysis exercises and web-based exercises.

New restoration ecology chapter

Chapter 13 is a brand new chapter on the important topic of ecological restoration. It explains how forests, grasslands, savannas, wetlands, and other ecosystems are being repaired and restored to ecological health, and provides many positive examples of restoration efforts.

New case studies and readings

Seventeen of the 25 chapter opening case studies are new, as are 10 of the boxed readings within chapters. A majority of the case studies and boxed readings in this edition are focused on current

events and success stories that display the global progress being made in environmental protection.

Google Earth placemarks

An exciting new feature in this edition are the Google Earth placemarks to every chapter. Google Earth is an online program that provides interactive satellite imagery of the earth and will help students understand the geographic context of places and topics in the text. Wherever students see this icon *[insert icon about here]* in the text, they can go to our website (<http://www.mhhe.com/cunningham10e>) to find a Google Earth placemark that will take them to the specific place being discussed. Students can zoom in to see amazing detail and zoom out to gain a global perspective.

Data Analysis Exercises

A Data Analysis box has been added to the end of every chapter. These exercises ask students to graph and evaluate data, to practice looking at numbers and graphs, and to critically analyze what they see.

Learning outcomes and other pedagogical tools

Chapter material now includes Learning Outcomes presented at the beginning of each chapter and a Reviewing Learning Outcomes section at the end of each chapter. These Learning Outcomes are connected to the major headings of each numbered section within the chapter to help students better organize the content and their study. Each chapter also includes a conclusion, which summarizes major points, a Practice Quiz to aid in understanding key concepts from the chapter, and Critical Thinking and Discussion questions that challenge students to apply what they have learned.

Specific changes by chapter

- Chapter 1 includes a new case study on the Green Olympics 2008 that illustrates China's new concern for environmental quality and its importance in our global environment. The environmental history section has been expanded to include Wangari Maathai, Gro Harlem Brundtland, and Yu Xiagong to demonstrate global diversity. Chapter 1 also has a major revision of current environmental conditions using 2006 data. The data analysis box introduces graphing.
- Chapter 2 has a new case study on the ethics of climate change. It also has important new material on statistics, probability and uncertainty. The section on worldviews and values has been reduced and folded into the text. The new data analysis box discusses bar graphs, pie charts, and scatter plots.
- Chapter 3 adds a data analysis exercise on extracting data from a graph.
- Chapter 4 benefits from a strengthened section on evolution and revised material on competition, predation, symbiosis, keystone groups, and succession. The data analysis box presents Gause's historic experiments on interspecific competition with population growth graphs.
- Chapter 5 opens with a positive case study on saving the reefs of Apo Island (Philippines). It also has new material on coastal zones, coral reefs, estuaries, and shorelines. The data analysis box explains how to read climate graphs.

- Chapter 6 combines an extensive revision of population growth dynamics together with a new section on changes in human life expectancies. The data analysis box demonstrates graphing exponential and logistic growth.
- Chapter 7 opens with a case study on successful family planning in Thailand. Chapter 7 also presents a revised and strengthened discussion of factors influencing population and different approaches to family planning in India are revealed in a What Do You Think box. The data analysis box displays how graphs can be used to explain, persuade, and inform.
- Chapter 8 starts with an encouraging case study on Guinea worm eradication. The discussion and data on infectious and emergent diseases is extensively revised and updated, and the data analysis box presents graphing multiple variables.
- Chapter 9 updates information on world food supply, farm policy, and soil conservation. A new section has been added on consumer choices and local food supplies. The data analysis box shows how to graph relative values on an index scale.
- Chapter 10 begins with a new case study on forgotten pollinators. The data analysis box assesses pesticide use in schools.
- Chapter 11 includes a significantly revised and updated opening case study on biodiversity and ecological resilience. The discussion of endangered and threatened species has been extended and strengthened, and the updated Exploring Science box on wolf reintroduction in Yellowstone and how animal behavior is studied with new remote sensing technology has been updated. The data analysis box addresses confidence limits in data.
- Chapter 12 has undergone a major reorganization. It opens with a new case study on saving the Great Bear rainforest and it has a new What Do You Think? box on forest thinning and salvage logging. A major new section on parks and preserves includes successes in preserving landscapes and relative percentages of different biomes protected, together with ecotourism and the role of indigenous people in biodiversity protection. The Data Analysis box is a practical exercise in detecting edge effects.
- Chapter 13 is a brand new chapter on the important topic of ecological restoration. It explains how forests, grasslands, savannas, wetlands, and other ecosystems are being repaired and restored to ecological health, and provides many positive examples of restoration efforts. An Exploring Science box discusses how we measure restoration success and the data analysis box clarifies concept maps.
- Chapter 14 opens with a new case study on cyanide heap leach gold mining. It continues with a rewritten section on earth structure and tectonic processes. A table of the world's worst polluted places shows the environmental effects of mining and smelting. The data analysis box explores mapping volcanoes.
- Chapter 15 contains a thoroughly updated discussion of critical issues of climate change, informed by the 2007 reports from the IPCC. It opens with an inspiring case study on California's new law to regulate greenhouse gases. It also includes a new box on free-air carbon enrichment studies and a data analysis box on graphing methane emissions.
- Chapter 16 opens with a new positive case study on controlling mercury pollution and market mechanisms for reducing greenhouse gases. It adds an encouraging case study on reducing air pollution in New Delhi, India. The data analysis box graphs air pollution abatement in Europe.

- Chapter 17 presents a new case study about China's gargantuan South to North Water Diversion project. It adds material on drying of the Aral Sea and Lake Chad, and it illustrates freshwater shortages, as well as the problems with dams and diversions. The data analysis box examines a water scarcity graph.
- Chapter 18 explains how low-cost natural systems can be used for wastewater treatment. The section on inorganic water pollutants has been extensively rewritten. The data analysis box elucidates water pollution graphs.
- Chapter 19 starts with a new positive case study on integrated gasification combined cycle (IGCC) "clean" coal plant. It continues with information on carbon sequestration. Discussion on oil drilling in Alaska and coal-bed methane has been retained. The discussion on nuclear energy has been updated with the report of first new reactor approval in 30 years. The data analysis box compares energy use by different countries.
- Chapter 20 presents an encouraging case study of Danish islands that depend entirely on renewable energy. It has a new discussion of hybrid gasoline-electric vehicles and adds an extensive new section on biofuels including the net energy balance of new energy sources. It updates geothermal, tidal and wave energy. The data analysis box illustrates energy calculations.
- Chapter 21 has a new positive case study on waste recycling in New York City. The chapter includes new information on ocean pollution, waste export to developing countries, and electronic waste and the data analysis box invites personal waste calculations.
- Chapter 22 revises and extends the heartening opening case study on Curitiba, Brazil. It retains the positive example of sustainable housing in London. The data analysis box elucidates graphing with a logarithmic scale.
- Chapter 23 begins with a new case study on Grameen bank microlending. It adds a new section on the Environmental Performance Index, and explores market mechanisms for pollution reduction. The data analysis box illustrates graphing the human development index.
- Chapter 24 retains its opening story on the snail darter and the endangered species act. The data analysis box discusses scatter plots and regression analysis.
- Chapter 25 opens with a new case study on saving the gray whale nursery in Laguna San Ignacio. The chapter includes new sections on environmental leadership, campus greening, and the millennium development goals. The data analysis box shows how students can do a campus environmental audit.

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