

ANNUAL EDITIONS

Environment

03/04



A·N·N·U·A·L E·D·I·T·I·O·N·S

Environment

03/04

Twenty-Second Edition

EDITOR

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University of Wyoming

John L. Allen is professor of geography at the University of Wyoming. He received his bachelor's degree in 1963 and his M.A. in 1964 from the University of Wyoming, and in 1969 he received his Ph.D. from Clark University. His special area of interest is the impact of contemporary human societies on environmental systems.

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Unit photo—United Nations photo by Ray Witlin.
3. **Energy: Present and Future Problems**
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Unit photo—United Nations photo by M. Gonzalez.
5. **Resources: Land, Water, and Air**
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Twenty-Second Edition

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Members of the Advisory Board are instrumental in the final selection of articles for each edition of ANNUAL EDITIONS. Their review of articles for content, level, currentness, and appropriateness provides critical direction to the editor and staff. We think that you will find their careful consideration well reflected in this volume.

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To the Reader

In publishing ANNUAL EDITIONS we recognize the enormous role played by the magazines, newspapers, and journals of the public press in providing current, first-rate educational information in a broad spectrum of interest areas. Many of these articles are appropriate for students, researchers, and professionals seeking accurate, current material to help bridge the gap between principles and theories and the real world. These articles, however, become more useful for study when those of lasting value are carefully collected, organized, indexed, and reproduced in a low-cost format, which provides easy and permanent access when the material is needed. That is the role played by ANNUAL EDITIONS.

At the beginning of our new millennium, environmental dilemmas long foreseen by natural and social scientists began to emerge in a number of guises: regional imbalances in numbers of people and the food required to feed them, international environmental crime, energy scarcity, acid rain, build-up of toxic and hazardous wastes, ozone depletion, water shortages, massive soil erosion, global atmospheric pollution and possible climate change, forest dieback and tropical deforestation, and the highest rates of plant and animal extinction the world has known in 65 million years.

These and other environmental problems continue to worsen in spite of an increasing amount of national and international attention to the issues surrounding them and increased environmental awareness and legislation at both global and national levels. The problems have resulted from centuries of exploitation and unwise use of resources, accelerated recently by the shortsighted public policies that have favored the short-term, expedient approach to problem solving over longer-term economic and ecological good sense. In Africa, for example, the drive to produce enough food to support a growing population has caused the use of increasingly fragile and marginal resources, resulting in the dryland deterioration that brings famine to that troubled continent. Similar social and economic problems have contributed to massive deforestation in middle and South America and in Southeast Asia.

Part of the problem is that efforts to deal with environmental issues have been intermittent. During the decade of the 1980s, economic problems generated by resource scarcity caused the relaxation of environmental quality standards and contributed to the refusal of many of the world's governments and international organizations to develop environmentally sound protective measures, which were viewed as too costly. More recently, in the 1990s, as environmental protection policies were adopted, they were often cosmetic, designed for good press but little else. Even with these public relations policies, governments often lacked either the will or the means to implement them properly. The absence of effective environmental policy has been particularly apparent in those countries that are striving to become economically developed. But even in the more highly developed nations, economic concerns tend to favor a loosening of environmental controls. In the United States, for example, the interests of maintaining jobs for the timber industry imperil many of the last areas of old-growth forests, and the desire to maintain agricul-

tural productivity at all costs causes the continued use of destructive and toxic chemicals on the nation's farmlands. In addition, concerns over energy availability have created the need for foreign policy and military action to protect the developed nations' access to cheap oil and have prompted increasing reliance on technological quick fixes, as well as the development of environmentally sensitive areas to new energy resource exploration and exploitation.

Despite the recent tendency of the U.S. government to turn its back on environmental issues and refuse to participate in international environmental accords, particularly those related to global warming, there is some reason to hope that, globally, a new environmental consciousness is awakening. Unfortunately, increasing globalization of the economy has meant globalization of other things as well, such as internal conflict and disease transmission. The emergence of terrorism as an instrument of national or quasi-national policy—particularly where terrorism may employ environmental contamination as a weapon—has the potential to produce future environmental problems that are almost too frightening to think about.

In *Annual Editions: Environment 03/04* every effort has been made to choose articles that encourage an understanding of the nature of the environmental problems that beset us and how, with wisdom and knowledge and the proper perspective, they can be solved or at least mitigated. Accordingly, the selections in this book have been chosen more for their intellectual content than for their emotional tone. They have been arranged into an order of topics—the global environment, population and economy, energy, the biosphere, resources, and pollution—that lends itself to a progressive understanding of the causes and effects of human modifications of Earth's environmental systems. We will not be protected against the ecological consequences of human actions by remaining ignorant of them.

Readers can have input into the next edition of *Annual Editions: Environment* by completing and returning the postpaid *article rating form* at the back of the book.



John L. Allen
Editor

Topic Guide

This topic guide suggests how the selections in this book relate to the subjects covered in your course. You may want to use the topics listed on these pages to search the Web more easily.

On the following pages a number of Web sites have been gathered specifically for this book. They are arranged to reflect the units of this *Annual Edition*. You can link to these sites by going to the DUSHKIN ONLINE support site at <http://www.dushkin.com/online/>.

ALL THE ARTICLES THAT RELATE TO EACH TOPIC ARE LISTED BELOW THE BOLD-FACED TERM.

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Agriculture

- 18. Where Have All the Farmers Gone?
- 20. Growing More Food With Less Water

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- 23. Three Pollutants and an Emission

Alternative energy

- 11. Beyond Oil: The Future of Energy

Aquifers

- 24. Groundwater Shock: The Polluting of the World's Major Freshwater Stores

Atmosphere

- 22. Feeling the Heat: Life in the Greenhouse

Biodiversity

- 15. What Is Nature Worth?
- 16. A Fragile Cornucopia: Assessing the Status of U.S. Biodiversity

Bioinvasion

- 17. Invasive Species: Pathogens of Globalization

Biosphere

- 15. What Is Nature Worth?

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- 13. Fossil Fuels and Energy Independence

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- 18. Where Have All the Farmers Gone?

Cultural values

- 18. Where Have All the Farmers Gone?

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- 5. Population and Consumption: What We Know, What We Need to Know

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- 6. An Economy for the Earth

Environmental laws

- 26. Statehouse and Greenhouse: The States Are Taking the Lead on Climate Change

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- 18. Where Have All the Farmers Gone?

Fossil fuels

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- 4. Population Control Today—and Tomorrow?
- 5. Population and Consumption: What We Know, What We Need to Know

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Sustainable economy

6. An Economy for the Earth

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1. How Many Planets? A Survey of the Global Environment
5. Population and Consumption: What We Know, What We Need to Know

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22. Feeling the Heat: Life in the Greenhouse

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9. Where the Sidewalks End

Urban problems

9. Where the Sidewalks End

Water management

20. Growing More Food With Less Water

Water quality

25. Water Quality: The Issues

Wind power

11. Beyond Oil: The Future of Energy

World Wide Web Sites

The following World Wide Web sites have been carefully researched and selected to support the articles found in this reader. The easiest way to access these selected sites is to go to our DUSHKIN ONLINE support site at <http://www.dushkin.com/online/>.

AE: Environment 03/04

The following sites were available at the time of publication. Visit our Web site—we update DUSHKIN ONLINE regularly to reflect any changes.

General Sources

Britannica's Internet Guide

<http://www.britannica.com>

This site presents extensive links to material on world geography and culture, encompassing material on wildlife, human lifestyles, and the environment.

EnviroLink

<http://envirolink.netforchange.com>

One of the world's largest environmental information clearinghouses, EnviroLink is a grassroots nonprofit organization that unites organizations and volunteers around the world and provides up-to-date information and resources.

Library of Congress

<http://www.loc.gov>

Examine this extensive Web site to learn about resource tools, library services/resources, exhibitions, and databases in many different subfields of environmental studies.

The New York Times

<http://www.nytimes.com>

Browsing through the archives of the New York Times will provide a wide array of articles and information related to the different subfields of the environment.

SocioSite: Sociological Subject Areas

<http://www.pscw.uva.nl/sociosite/TOPICS/>

This huge sociological site from the University of Amsterdam provides many discussions and references of interest to students of the environment, such as the links to information on ecology and consumerism.

U.S. Geological Survey

<http://www.usgs.gov>

This site and its many links are replete with information and resources in environmental studies, from explanations of El Niño to discussion of concerns about water resources.

UNIT 1: The Global Environment: An Emerging World View

Alternative Energy Institute (AEI)

<http://www.altenergy.org>

The AEI will continue to monitor the transition from today's energy forms to the future in a "surprising journey of twists and turns." This site is the beginning of an incredible journey.

Earth Science Enterprise

<http://www.earth.nasa.gov>

Information about NASA's Mission to Planet Earth program and its Science of the Earth System can be found here. Surf to learn about satellites, El Niño, and even "strategic visions" of interest to environmentalists.

IISDnet

<http://iisd.ca>

The International Institute for Sustainable Development, a Canadian organization, presents information through gateways entitled Business and Sustainable Development, Developing Ideas, and Hot Topics. Linkages is its multimedia resource for environment and development policymakers.

National Geographic Society

<http://www.nationalgeographic.com>

Links to *National Geographic's* huge archive are provided here. There is a great deal of material related to the atmosphere, the oceans, and other environmental topics.

Research and Reference (Library of Congress)

<http://lcweb.loc.gov/rr/>

This research and reference site of the Library of Congress will lead to invaluable information on different countries. It provides links to numerous publication, bibliographies, and guides in area studies that can be of great help to environmentalists.

Santa Fe Institute

<http://acoma.santafe.edu>

This home page of the Santa Fe Institute—a nonprofit, multidisciplinary research and education center—will lead to many interesting links related to its primary goal: to create a new kind of scientific research community, pursuing emerging science.

Solstice: Documents and Databases

<http://solstice.crest.org/docndata.shtml>

In this online source for sustainable energy information, the Center for Renewable Energy and Sustainable Technology (CREST) offers documents and databases on renewable energy, energy efficiency, and sustainable living. The site also offers related Web sites, case studies, and policy issues. Solstice also connects to CREST's Web presence.

United Nations

<http://www.unsystem.org>

Visit this official Web site Locator for the United Nations System of Organizations to get a sense of the scope of international environmental inquiry today. Various UN organizations concern themselves with everything from maritime law to habitat protection to agriculture.

United Nations Environment Programme (UNEP)

<http://www.unep.ch>

Consult this home page of UNEP for links to critical topics of concern to environmentalists, including desertification, migratory species, and the impact of trade on the environment. The site will direct you to useful databases and global resource information.

UNIT 2: The World's People: Population and Economy

The Hunger Project

<http://www.thp.org>

Browse through this nonprofit organization's site to explore the ways in which it attempts to achieve its goal: the sustainable end to global hunger through leadership at all levels of society. The

Hunger Project contends that the persistence of hunger is at the heart of the major security issues that are threatening our planet.

Poverty Mapping

<http://www.povertymap.net>

Poverty maps can quickly provide information on the spatial distribution of poverty. This site provides maps, graphics, data, publications, news, and links that provide the public with poverty mapping from the global to the subnational level.

World Health Organization

<http://www.who.int>

The home page of the World Health Organization provides links to a wealth of statistical and analytical information about health and the environment in the developing world.

World Population and Demographic Data

<http://geography.about.com/cs/worldpopulation/>

On this site, information about world population and additional demographic data for all the countries of the world is provided.

WWW Virtual Library: Demography & Population Studies

<http://demography.anu.edu.au/VirtualLibrary/>

This is a definitive guide to demography and population studies. A multitude of important links to information about global poverty and hunger can be found here.

UNIT 3: Energy: Present and Future Problems

Alliance for Global Sustainability (AGS)

<http://www.global-sustainability.org> (AGS)

The AGS is a cooperative venture seeking solutions to today's urgent and complex environmental problems. Research teams from four research universities study large-scale, multidisciplinary environmental problems that are faced by the world's ecosystems, economies, and societies.

Alternative Energy Institute, Inc.

<http://www.altenergy.org>

On this site created by a nonprofit organization, learn about the impacts of the use of conventional fuels on the environment. Also learn about research work on new forms of energy.

Communications for a Sustainable Future

<http://csf.colorado.edu>

This site will lead to information on topics in international environmental sustainability. It pays particular attention to the political economics of protecting the environment.

Energy and the Environment: Resources for a Networked World

<http://zebu.uoregon.edu/energy.html>

An extensive array of materials having to do with energy sources—both renewable and nonrenewable—as well as other topics of interest to students of the environment is found on this site.

Institute for Global Communication/EcoNet

<http://www.igc.org/igc/gateway/>

This environmentally friendly site provides links to dozens of governmental, organizational, and commercial sites having to do with energy sources. Resources address energy efficiency, renewable generating sources, global warming, and more.

Nuclear Power Introduction

<http://library.thinkquest.org/17658/pdfs/nucintro.pdf>

Information regarding alternative energy forms can be accessed here. There is a brief introduction to nuclear power and a link to maps that show where nuclear power plants exist.

U.S. Department of Energy

<http://www.energy.gov>

Scrolling through the links provided by this Department of Energy home page will lead to information about fossil fuels and a variety of sustainable/renewable energy sources.

UNIT 4: Biosphere: Endangered Species

Endangered Species

<http://www.endangeredspecies.com/>

This site provides a wealth of information on endangered species anywhere in the world. Links providing data on the causes, interesting facts, law issues, case studies, and other issues on endangered species are available.

Friends of the Earth

<http://www.foe.co.uk/index.html>

Friends of the Earth, a nonprofit organization based in the United Kingdom, pursues a number of campaigns to protect the Earth and its living creatures. This site has links to many important environmental sites, covering such broad topics as ozone depletion, soil erosion, and biodiversity.

Smithsonian Institution Web Site

<http://www.si.edu>

Looking through this site, which will provide access to many of the enormous resources of the Smithsonian, offers a sense of the biological diversity that is threatened by humans' unsound environmental policies and practices.

World Wildlife Federation (WWF)

<http://www.wwf.org>

This home page of the WWF leads to an extensive array of information links about endangered species, wildlife management and preservation, and more. It provides many suggestions for how to take an active part in protecting the biosphere.

UNIT 5: Resources: Land, Water, and Air

Agriculture Production Statistics

<http://www.wri.org/statistics/fao-prd.html>

The Food and Agriculture Organization of the UN (FAO) provides annual statistics, on a world-wide basis, on all important data of crop and livestock production. Coverage includes land use, irrigation, human population, index numbers of agriculture production, major crops, livestock numbers, livestock products, food supply, and means of production for individual countries, continents, and the world. Web links to the FAOSTAT Database Gateway are provided.

Global Climate Change

<http://www.puc.state.oh.us/consumer/gcc/index.html>

The goal of this PUCO (Public Utilities Commission of Ohio) site is to serve as a clearinghouse of information related to global climate change. Its extensive links provide an explanation of the science and chronology of global climate change, acronyms, definitions, and more.

National Oceanic and Atmospheric Administration (NOAA)

<http://www.noaa.gov>

Through this home page of NOAA, you can find information about coastal issues, fisheries, climate, and more.

National Operational Hydrologic Remote Sensing Center (NOHRSC)

<http://www.nohrsc.nws.gov>

Flood images are available at this site of the NOHRSC, which works with the U.S. National Weather Service to track weather-related information.

Virtual Seminar in Global Political Economy/Global Cities & Social Movements

<http://csf.colorado.edu/gpe/gpe95b/resources.html>

Links to subjects of interest in regional environmental studies, covering topics such as sustainable cities, megacities, and urban planning are available here. Many international nongovernmental organizations are included.

Websurfers Biweekly Earth Science Review

<http://www.mindspring.com/~michaelg2/weeksreviews.html>

This is a biweekly compilation of Internet sites devoted to the terrestrial and planetary sciences. It includes a list of hyperlinks to related earth science sites and news items.

UNIT 6: Pollution: The Hazards of Growth

IISDnet

<http://www.iisd.org/default.asp>

The International Institute for Sustainable Development's site presents information through links on business and sustainable development, developing ideas, and Hot Topics.

Persistent Organic Pollutants (POP)

<http://irptc.unep.ch/pops/>

Visit this site to learn more about persistent organic pollutants (POPs) and the issues and concerns surrounding them.

School of Labor and Industrial Relations (SLIR): Hot Links

<http://www.lir.msu.edu/hotlinks/>

Michigan State University's SLIR page connects to industrial relations sites throughout the world. It has links to U.S. government statistics, newspapers and libraries, international intergovernmental organizations, and more.

Space Research Institute

<http://arc.iki.rssi.ru/Welcome.html>

For a change of pace, browse through this home page of Russia's Space Research Institute for information on its Environment Monitoring Information Systems, the IKI Satellite Situation Center, and its Data Archive.

Worldwatch Institute

<http://www.worldwatch.org>

The Worldwatch Institute, dedicated to fostering the evolution of an environmentally sustainable society, presents this site with access to *World Watch Magazine* and *State of the World 2000*. Click on Alerts and Press Briefings for discussions of current problems.

We highly recommend that you review our Web site for expanded information and our other product lines. We are continually updating and adding links to our Web site in order to offer you the most usable and useful information that will support and expand the value of your Annual Editions. You can reach us at: <http://www.dushkin.com/annualeditions/>.

UNIT 1

The Global Environment: An Emerging World View

Unit Selections

1. **How Many Planets? A Survey of the Global Environment**, *The Economist*
2. **Forget Nature. Even Eden Is Engineered**, Andrew C. Revkin
3. **Crimes of (a) Global Nature**, Lisa Mastny and Hilary French

Key Points to Consider

- What are the connections between the attempts to develop sustainable systems and the quantity and quality of environmental data? Are there also relationships between data and the role of technology and economic systems in shaping the environmental future?
- In what ways are environmental changes engineered by humans, and how can human planning systems develop mechanisms to ensure that the human-designed environment will be a sustainable one?
- How well do international agreements work in controlling “environmental crimes” such as the taking of endangered species, hazardous waste dumping, or emissions of harmful pollutants? Are there ways in which international environmental accords could be made more enforceable?



Links: www.dushkin.com/online/

These sites are annotated in the World Wide Web pages.

Alternative Energy Institute (AEI)

<http://www.altenergy.org>

Earth Science Enterprise

<http://www.earth.nasa.gov>

IISDnet

<http://iisd.ca>

National Geographic Society

<http://www.nationalgeographic.com>

Research and Reference (Library of Congress)

<http://lcweb.loc.gov/rr/>

Santa Fe Institute

<http://acoma.santafe.edu>

Solstice: Documents and Databases

<http://solstice.crest.org/docndata.shtml>

United Nations

<http://www.unsystem.org>

United Nations Environment Programme (UNEP)

<http://www.unep.ch>

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UNIT 1

The Global Environment: An Emerging World View

Three selections provide information on the current state of Earth and the changes we will face.

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1. How Many Planets? A Survey of the Global Environment, *The Economist*, July 6, 2002

In a series of six interconnected short essays, the editors of *The Economist* present an up-to-date summary of global environmental issues, including **sustainable development**, the amount of information available on the environment, **climate change**, and the role of both **technology** and **market forces** in helping to shape the future of environmental systems.

3

2. Forget Nature. Even Eden Is Engineered, Andrew C. Revkin, *New York Times*, August 20, 2002

The world has become a place where people have altered the atmosphere and **ecosystems** to the point that those systems are no longer natural but "engineered"—although not usually in a conscious manner. Choices made within the next few years will determine whether the new human-dominated global ecosystem will become a "**noosphere**"—a planet controlled by reason—or an environmental wasteland.

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3. Crimes of (a) Global Nature, Lisa Mastny and Hilary French, *World Watch*, September/October 2002

One of the more dramatic but least-known global economic phenomena is the illegal traffic in **endangered species**. Demands for rare pets, aphrodisiacs, or clothing ensure that the growing trend toward **international environmental crime** will continue. But more than just a trade in biological commodities, this new set of illegal activities that violate **international environmental accords**, also includes dumping of **hazardous wastes** and the manufacture and use of environmentally destructive substances.

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UNIT 2

The World's People: Population and Economy

Six unit selections examine the problems the world will have in feeding and caring for its ever-increasing population.

Unit Overview

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4. Population Control Today—and Tomorrow?, Jacqueline R. Kasun, *The World & I*, June 2001

One of the more anachronistic elements of recent global demographics is that while **population growth** has begun to taper off worldwide, the programs and funding for **population control** have been expanding. In many **developing countries** it is far easier to obtain contraceptives than it is to obtain basic medicines.

40

5. **Population and Consumption: What We Know, What We Need to Know**, Robert W. Kates, *Environment*, April 2000

A general consensus exists among scientists that the roots of the current **environmental crisis** are to be found in a combination of **population growth**, affluence, and increasing **technology**. No such consensus exists, however, about the ultimate causes of either population growth or the desire to consume. Notwithstanding this lack of agreement, society needs to sublimate the desire to acquire things for the good of the **global commons**.

44

6. **An Economy for the Earth**, Lester R. Brown, *The Humanist*, May/June 2002

A shift in **economic theory** similar to the transition between the Ptolemaic geocentric universe and the Copernican model is necessary to save Earth from continuing **environmental degradation**. The question is whether we will continue to see the environment as a subset of the economy, resulting in an economy that is disjunctive with the ecosystem, or begin to see the economy as a subset of the environment, allowing us to produce an environmentally **sustainable economy**.

51

7. **The Eco-Economic Revolution: Getting the Market in Sync With Nature**, Lester R. Brown, *The Futurist*, March/April 2002

If global **economic development** is to continue, the **global economy** must be systematically restructured to make it environmentally sustainable. The future **eco-economy** would see decreases in reliance on fossil fuels and increases in reliance on sustainable energy systems, a decrease in deforestation and an increase in forest planting. The scale of this **environmental revolution** is similar to that of the agricultural and industrial revolutions of the past.

55

8. **Poverty and Environmental Degradation: Challenges Within the Global Economy**, Akin L. Mabogunje, *Environment*, January/February 2002

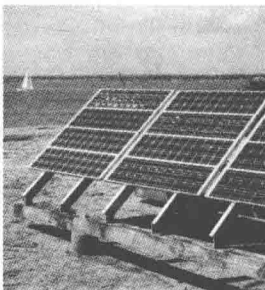
The link between increasing **poverty** and increasing **environmental degradation** is easy to see in developing countries. For many people, the increasing **globalization** of the economy has meant deepening poverty as approximately 20 percent of the world's least healthy, poorest educated, and most inadequately fed and housed population is left behind in the drive toward a new global market. Attempts on the part of the disenfranchised to catch up contribute to loss of biodiversity, urban pollution, deforestation, and other environmental ills.

64

9. **Where the Sidewalks End**, Molly O'Meara Sheehan, *World Watch*, November/December 2002

One of the dominant trends of the **global population** in the opening years of the twenty-first century is that of **urbanization**, with an increasing percentage of the world's population living in urban areas. A by-product of this trend is that of increasing slums. The UN now estimates that one out of every seven people in the world lives in an **urban slum**—with almost no public services: electricity, water, sewage, or police protection.

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UNIT 3

Energy: Present and Future Problems

Five articles in this unit consider the problems of meeting present and future energy needs. Alternative energy sources are also examined.

Unit Overview

80

10. **Energy: A Brighter Future?**, *The Economist*, February 10, 2001

Conventional wisdom about **energy resources** for the last three decades has been that significant government intervention will be necessary to bring about conservation. Recent experience, however, has shown that the **energy market** is the driving factor behind conservation and that the best thing that governments can do is to get out of the way.

82

11. **Beyond Oil: The Future of Energy**, Fred Guterl, Adam Piore, and William Underhill, *Newsweek*, April 15, 2002

Some geologists believe that world **oil production** will peak by 2005–2008, after which chronic shortages of petroleum will become a way of life. There are already **alternative energy** technologies in place that will be able to pick up part of the slack—but by no means all of it. Renewable energy strategies such as **solar and wind power** are being utilized. Much of the hope for sustained energy availability rests on the development and implementation of inexpensive **hydrogen fuel cells**, which are already in use in Iceland.

84

12. **Renewable Energy: A Viable Choice**, Antonia V. Herzog, Timothy E. Lipman, Jennifer L. Edwards, and Daniel M. Kammen, *Environment*, December 2001

The widespread use of **renewable energy** sources such as solar, wind, and biomass energy could not only reduce U.S. reliance on fossil fuels, thereby strengthening the economy, but could also significantly improve **environmental quality** in the world's most energy-hungry region. To facilitate the adoption of energy systems based on something other than oil or coal, the United States needs a strong **national energy policy**.

92

13. **Fossil Fuels and Energy Independence**, B. Samuel Tanenbaum, *The World & I*, May 2002

In order for the United States to achieve energy independence or self-sufficiency, the **conservation strategies** developed since the Arab oil embargo of the early 1970s need to be combined with the newest fuel-saving technologies. These new technologies, including hybrid gasoline-electric motor vehicles, could reduce overall demand for **fossil fuels** by as much as 50 percent within the next 20 years.

103

14. **Power Struggle: California's Engineered Energy Crisis and the Potential of Public Power**, Harvey Wasserman, *Multinational Monitor*, June 2001

The **California energy crisis** of 2000 was largely the consequence of a mismatch between supply and demand. But a year after the rolling blackouts that devastated California's **energy system**, research has demonstrated that the supply of energy was sufficient to meet the demand, but deregulated public utilities withheld that supply to produce artificial shortages and, therefore, higher prices for electricity.

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UNIT 4

Biosphere: Endangered Species

Three unit articles examine the problems in the world's biosphere that include economic issues, natural ecosystems, and bioinvasion.

Unit Overview

118

15. **What Is Nature Worth?**, Edward O. Wilson, *The Wilson Quarterly*, Winter 2002

Preserving our living natural environment is important for the maintenance of existing **economic systems** and the hope for future economic prosperity. It is impossible to calculate the importance of a healthy **biosphere** for either the Earth's material well-being or the health of the human race. But there are powerful moral arguments as well as economic ones that should compel us to take responsibility for the future of the natural world.

121

16. **A Fragile Cornucopia: Assessing the Status of U.S. Biodiversity**, Bruce A. Stein, *Environment*, September 2001

While many think of tropical rain forests when they think of **biodiversity**, the United States, with its enormous expanse of territory, harbors a wide array of ecological conditions and, therefore, a surprising amount of biological complexity. As scientists learn more about how **natural ecosystems** work, they are discovering that much of the rich biodiversity of the United States has global significance.

131

17. **Invasive Species: Pathogens of Globalization**, Christopher Bright, *Foreign Policy*, Fall 1999

One of the least expected and least visible consequences of economic globalization has been the spread of **invasive species**—plants and animals that are hitchhiking through the global trading network and finding niches where they can survive better than native species. This **bioinvasion** is difficult to control because it means altering the nature of the **global trading economy** that released invasive species in the first place.

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UNIT 5

Resources: Land, Water, and Air

In this unit, five selections discuss the environmental problems affecting our land, water, and air resources.

Unit Overview

148

18. **Where Have All the Farmers Gone?**, Brian Halweil, *World Watch*, September/October 2000

The movement toward a **global economy** has meant a standardization in the management of much of the world's land. These new standardized **land management** practices have, in turn, led to a decrease in the number of farmers.

150

19. **All the Wild Rivers**, Curtis Runyan, *World Watch*, January/February 2001

The twentieth century witnesses enormous global enthusiasm for controlling and harnessing rivers, largely by building **dams and reservoirs**. In the United States, the number of dams being removed from river valleys is now greater than those being built. In countries like India and Brazil, major **hydrological projects** are also being challenged and the future of river control will very likely be different from the recent past.

163

20. **Growing More Food With Less Water**, Sandra Postel, *Scientific American*, February 2001

Most of the world's **agricultural production** is dependent upon **irrigation** to provide a predictable **water supply**. But most of the world's irrigation systems are remarkably inefficient and wasteful of water. Sandra Postel investigates what the future holds.

165

21. **Oceans Are on the Critical List**, Anne Platt McGinn, *USA Today Magazine (Society for the Advancement of Education)*, January 2000

The world's oceans are both central to the **global economy** and to human and planetary health. Yet these critical areas are being threatened by overfishing, **habitat degradation**, pollution, introduction of alien species, and **climate change**.

168

22. **Feeling the Heat: Life in the Greenhouse**, Michael D. Lemonick, *Time*, April 9, 2001

No force short of nuclear war or the impact of an asteroid has as much capacity to change the Earth's **natural ecosystems** as does **climate change**. While most scientists agree that the current trend of **global warming** is "anthropogenic" or human-caused, political and economic issues get in the way of solutions and strategies for coping with and reducing the threat of an enhanced **greenhouse effect**.

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UNIT 6

Pollution: The Hazards of Growth

The four selections in this unit weigh the environmental impacts of the growth of human population.

Unit Overview

178

23. Three Pollutants and an Emission, Dallas Burtraw, *Brookings Review*, Spring 2002

Existing and potential legislation in the United States would attack the problem of **air pollution** by regulating against the emissions of three pollutants—sulfur dioxide, nitrogen oxides, and mercury—from large stationary sources. But carbon dioxide, the chief greenhouse gas culpable in **global warming** debates, remains an “emission” rather than a “pollutant” in definitional terms. A major debate will be taking place as to whether the attempt should be made to regulate carbon dioxide emissions along with the pollutants.

181

24. Groundwater Shock: The Polluting of the World's Major Freshwater Stores, Payal Sampat, *World Watch*, January/February 2000

Most of the planet's freshwater resources—97 percent to be exact—is stored in vast underground **aquifers**, which supply nearly 40 percent of the world's population with drinking water and over 90 percent of the world's irrigated agriculture with the water necessary to sustain it. While the pollution of surface water is easily recognizable and has more readily understood sources, **groundwater pollution** is difficult to identify and tends to have sources that are less visible.

185

25. Water Quality: The Issues, Mary H. Cooper, *CQ Researcher*, November 24, 2000

Despite the tremendous improvements that have taken place in **water quality** in many American rivers, lakes, and coastal waters since the passage of the **Clean Water Act** in 1972, approximately 40 percent of the nation's inland and coastal waters are still too dirty to fish or swim in. Government regulation has done much to control **point-source pollution**; still remaining, however, are the **nonpoint-source pollution** problems that contribute to most water pollution in the United States.

195

26. Statehouse and Greenhouse: The States Are Taking the Lead on Climate Change, Barry G. Rabe, *Brookings Review*, Spring 2002

In the face of the federal government's unwillingness or inability to do anything about regulating the **pollution** that contributes to **climate change** by enhancing the **greenhouse effect** of the atmosphere, many state governments in the United States are taking the lead in **environmental regulation** of greenhouse gases. Some states, such as Oregon, have focused their attention on new energy facilities while others, like Massachusetts, have concentrated on existing greenhouse gas sources.

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Appendix I. Environmental Information Retrieval

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