

Contents

❖ Specialized Topics

Introduction: On Solving Environmental Problems	1
Three Points of View/Environmental Decisions/ How Decisions Are Based and Who Is Making Them/ Making Sound Environmental Decisions	

PART 1 HUMANS AND OTHER NATIONS THAT INHABIT THE EARTH 11

Chapter 1	Lessons from Ecology: Structure in Ecosystems 13 Peregrine Falcons and the Definition of Species/ How Organisms Live Together/Looking Ahead/ ❖ Photosynthesis
-----------	--

Chapter 2	Human Population Problems 25 Growing and Changing Populations/Effects of Population Growth/Limiting Population Growth/ Outlook for Population Growth in the Future/ ❖ Population
-----------	--

Chapter 3	Protecting Wildlife Resources 56 Is a Little Fish Worth More Than a Big Dam?/ The Value of Species/How Species Become Endangered/Protecting Wildlife Resources/ ❖ Endangered Ocean Mammals Versus Endangered Native Cultures
-----------	---

PART 2 WATER RESOURCE PROBLEMS**87**

Chapter 4 Lessons from Ecology: Water and Life 89
The Hudson River/Water—A Limiting Factor
for Life/Water as a Resource/The Unique Properties
of Water/Water Habitats/ How Much is a Part per
Trillion Anyway?

Chapter 5 Waterborne Diseases 115
Learning from Past Mistakes/How Can We Tell If
Water Is Unsafe to Drink?/ Testing for the
Indicator Organisms

Chapter 6 Chemicals in Drinking Water 130
Drinking Water: Chemical Standards/The Mercury
Problem/Cadmium Pollution/Nitrates in Drinking
Water/ Why Nitrites Are Poisonous/PCBs: Organic
Chemical Water Pollutants/PCBs in Food/
Phthalates: An Environmental Problem in the Making?/
Pesticides in Drinking Water/Are Safe Drinking
Water Laws the Answer?

Chapter 7 Purifying Water 162
The Difference Between Water Treatment and Water
Pollution Control/Water Treatment/ A Simple Test
for Free Chlorine/ Ozonation to Purify Water

Chapter 8 Organic Wastes and Dissolved Oxygen 173
Why Organic Wastes Are Pollutants/Stream Health
and Dissolved Oxygen/ Organic Wastes: How to
State Their Levels and How to Measure Them

Chapter 9 Eutrophication 184
Feeding Lakes/How Water Becomes Eutrophic/
How Can Eutrophication Be Controlled?/Lake Erie:
A Case History/ Other Problems with Detergents:
Foaming Waters and Biodegradability

Chapter 10	Water Pollution Control	196
	Controlling Water Pollution/Water Pollution	
	Control at Point Sources/Control of Water Pollution	
	from Non-Point Sources/Other Ways of Treating Waste	
	Water/• How Tertiary Treatment Works/• Problems from	
	Chlorination of Sewage/• Control of Storm Waters	
PART 3 CONVENTIONAL SOURCES OF ENERGY: RESOURCES AND ISSUES		219
Chapter 11	Lessons from Ecology: Energy Laws and the Environment	222
	The First Law/The Second Law	
Chapter 12	How We Use Energy Resources	230
	Energy Conversions and the Second Law/Electric	
	Power/Fusion/Fuel Cells/The Uses of Energy and	
	the Fuels that Supply It	
Chapter 13	Coal: A Mixed Blessing	249
	Introduction/Coal and Its Uses/Environmental and	
	Social Impact of Coal/Health and Safety of the Coal	
	Miner/Coal at the Point of Use/• Transportation	
	of Coal	
Chapter 14	Oil and Natural Gas	283
	A Brief History of Oil in the United States/	
	Finding and Producing Oil and Gas/What Are Oil	
	and Gas?/Oil and Gas Resources/• The Power of the	
	Cartel and Its Impact on Oil Companies/• Oil	
	Conservation—More than One Reason to Save/• Gas	
	from Coal (Coal Gasification)/• Oil from Coal	
	(Coal Liquefaction)	
Chapter 15	Nuclear Power	311
	Introduction/Light Water Reactors/Fuel	
	Reprocessing and Spent Fuel Rod Storage/	
	Mixed Oxide Fuel and Plutonium Transport/	
	International Safeguards/Storage or Disposal	
	of the Wastes from Fuel Reprocessing/• Alternatives to	
	Reprocessing/• Liquid Metal Fast Breeder Reactor	

**PART 4 HOW CONVENTIONAL FUELS
AFFECT ENVIRONMENTAL QUALITY 347**

Chapter 16 Lessons from Ecology: The Atmosphere and Climate on Earth 350
Birth of the Solar System/The Carbon Cycle/The Importance of Climate to Life/The Sulfur Cycle/The Nitrogen Cycle/Inversions

Chapter 17 Air Pollution: Air Pollution Episodes, Carbon Dioxide, and Carbon Monoxide 362
Air Pollution Episodes: A Slow Awakening/Carbon Dioxide/Carbon Monoxide/Effects of Carbon Monoxide on the Body

Chapter 18 Sulfur Oxide and Particulate Air Pollutants 376
Sulfur Oxides/Particulate Matter/Lead Compounds in the Air/The Health Effects of Sulfur Oxides and Particulates/Children and Lead Poisoning

Chapter 19 Photochemical Air Pollution 398
What Is Photochemical Pollution?/Control of Photochemical Air Pollution/A Brief Summary: Where Are We on the Road to Clean Air?/The Effects of Nitrogen Oxides on Our Health/The Chemistry of Photochemical Air Pollution

Chapter 20 Oil Pollution 416
Where Does the Oil Come From?/Biological Effects of Oil in the Environment/Economic and Social Effects of Mixing Oil and Water/Lessening Oil Pollution and Its Effects

Chapter 21 Thermal Pollution 431
What is Thermal Pollution?/Biological Effects of Thermal Pollution/Better Ways to Dispose of Waste Heat

**PART 5 NATURAL SOURCES OF POWER
AND ENERGY CONSERVATION** 451

Chapter 22 Power from Falling Water 454
 Conventional Hydroelectric Generation/Pumped Storage/Small-Scale and Low-Head Hydropower/
 Environmental Impact of Reservoirs/ How Reservoir Waters Become Oxygen Poor/Power from
 the Tides/ Methods to Increase and Steady Tidal Energy

Chapter 23 Power from the Wind and Power from the Heat in the Earth 470
 Power from the Wind/Windmill Designs/Wind Resources of the United States/Environmental
 Problems and Cost of Windmills

Chapter 24 Solar Energy 486
 Introduction and History/The Sun as a Source of Hot Water and Heat for Buildings/Electricity
 Generation and Sunlight/Biomass: Biological Conversion of Sun's Energy/Ocean Thermal Energy Conversion/Prospects for Solar Energy

Chapter 25 Energy Conservation 510
 The Way We Heat Homes and Make Hot Water/The Manner of Transport of People and Goods/Peak Load Pricing—Decreasing the Need for New Power Plants

PART 6 TOXIC MATERIALS, CANCER, AND THE ENVIRONMENT 533

Chapter 26 Tracking Down Carcinogens in the Environment 535
 The Epidemiologist and Cancer/How Potent Are Various Carcinogens?/ Carcinogenesis/
 Testing for Carcinogens

Chapter 27	Carcinogens in Water and in Air	544
	Toxic Organics and the New Orleans Water Supply/ The Epidemiologist as a Detective/Arsenic/ Asbestos/Ozone/ Skin Cancer/Smoking: A Personal Form of Air Pollution/Radiation and Cancer/Toxic Substances in the Workplace	
Chapter 28	Toxic Substances in Foods, Drugs, and Cosmetics	583
	Intentional Food Additives/Artificial Sweeteners and the Delaney Clause/Artificial Colors in Foods/Preservatives/Added Vitamins and Minerals/ Unintentional Food Additives/Natural Toxins/ Pesticide Residues in Food/Drugs in Animal Feeds/ PBBs: Story of an Accidental Disaster/Toxic Substances in Drugs and Cosmetics	
Chapter 29	Controlling Toxic Substances	612
	Laws Controlling Toxic Substances/TOSCA/ An Expensive Solution?	

PART 7 LAND RESOURCE ISSUES 619

Chapter 30	Lessons from Ecology: Land Habitats and Communities	620
	Succession and Climax/World Biomes/Some Characteristics of Communities/Influences on Succession	
Chapter 31	Private Land Use Decisions	630
	A Changing Tradition/Enforcing Urban-Suburban Land Use Plans/Preserving Rural Land	
Chapter 32	Preserving Public Natural Areas	643
	The Public Preservation Movement/Administration of the Federal Natural Areas/Problems of Accessibility/ Expanding the System of Natural Areas	

PART 8 FEEDING THE WORLD'S PEOPLE 683

Chapter 33	Food Resources	685
	Is There Really a Food Crisis?/How Can We Grow More Food?	

Chapter 34	Erosion and Pesticides	699
	Erosion/Pesticides and Food Production/ • Which Are the Safest Pesticides?	
Chapter 35	Food and the Future	719
	Economic and Political Problems in Food Production/Optimist Versus the Pessimist/ Are Grain Reserves a Solution?	
Conclusion		731
	Two Voices/Restoring the Environment—Personal Choices	
Glossary		737