CONTENTS

1. INTRODUCTION 1

Levels and movement of pollutants, 2 Effects of pollution, 6 Technological hazards, 10

2. THE GROWTH OF POPULATION, PRODUCTION, AND CONSUMPTION 14

Population growth, 14 Living standards in the United States, 18 Living standards in the rest of the world, 23 Natural resource consumption, 26 The limits to growth, 29

3 AIR POLLUTION: INTRODUCTION 32

The atmosphere and its constituents, 32 Sources and emissions of air pollutants, 33 Particulate matter, 36 Sulfur oxides, 38 Carbon monoxide, 40 Hydrocarbons, 43 Nitrogen oxides, 45 Other air pollutants, 46 The costs of air pollution, 48

4. AIR POLLUTION: METEOROLOGY AND CLIMATOLOGY 51

Temperature distribution in the atmosphere, 51 The radiation balance of the earth, 55 Temperature inversions, 61 Local effects of pollution on climates, 64 Global effects of pollution on climate, 66

5. AIR POLLUTION: INDUSTRIAL EMISSIONS AND CLASSICAL SMOG
 73
 The history of smoke pollution, 73
 Industrial emissions, 78
 Control techniques, 82

- x Contents
- 6. AIR POLLUTION: MOTOR VEHICLE EMISSIONS AND PHOTOCHEMICAL SMOG 89 Photochemical smog, 90 Sources and controls of motor vehicle emissions from the internal combustion engine, 94 Alternative engines and power sources, 101 Aircraft emissions, 108 Lead. 109 7. NOISE 112 Sound and hearing, 112 Occupational noise exposures, 114 Public noise exposures, 116 Sonic booms, 121 8. WATER POLLUTION: INTRODUCTION 125 The earth's water balance, 125 Water pollutants, 130 Sources of water pollution, 136 The costs of water pollution, 138 9. WATER POLLUTION: MUNICIPAL 140 Municipal water supplies, 140 Municipal sewers and sewage, 144 Composition and treatment of domestic sewage, 147 Primary treatment, 149 Secondary treatment, 150 Advanced waste treatment methods ("tertiary treatment"), 153 Detergents, 157 10. WATER POLLUTION: INDUSTRIAL AND COMMERCIAL 162 Shipping pollution, 163 Industrial water wastes, 165 Fish kills, 169 Treatment and disposal of industrial water wastes, 170 11. AGRICULTURAL POLLUTION 173 Farm animal wastes, 174 Soil erosion, 179 Plant residues, 183

Agricultural chemicals, 184 Miscellaneous agricultural pollution, 186 Conclusion, 187

12. PESTICIDES

History of pesticide usage, 189 Important types of pesticides, 190 Effects of pesticides, 196 Alternative methods of pest control, 203 Conclusion, 207

13. SOLID WASTES 211

Types, characteristics, and quantities of solid wastes, 211 Current disposal methods, 214 The costs of solid wastes, 218 Packaging, 219 Junked automobiles, 222 Better solid waste managment, 223

14. THERMAL POLLUTION 229

The second law of thermodynamics, 229 Effects of thermal pollution, 234 Alternatives to once-through cooling, 238 Uses of waste heat, 240 Conclusion, 242

15. RADIATION

Radiation and its effects on life, 244 Radiation sources in the environment, 250 Radiation standards, 254 Nuclear power plants, 258

16. ELECTRIC POWER GENERATION 265

History of electric power generation, 266 Pollution from steam-electric generating plants, 267 Present alternative methods of generating electricity, 272 Future methods of generating electricity, 274 Conclusion, 278

.

17. FOODS, DRUGS, AND COSMETICS 281 Foods, 281 **Drugs**, 288 Cosmetics, 292 Federal food, drug, and cosmetic legislation, 293 18. POLLUTION IN FOREIGN COUNTRIES 296 National problems, 296 International problems and programs, 300 Declaration on the Human Environment, 302 ECONOMIC AND LEGAL QUESTIONS 19 306 Economics of pollution, 306 Legal aspects of pollution, 310 The cost of a clean environment, 313 20. LEGISLATION 316 Air pollution, 317 Water pollution, 319 Solid wastes, 322 Pesticides, 323 General environmental legislation, 324 Environmental Protection Agency, 325 **EPILOGUE** 328 APPENDIX A. CONVERSION FACTORS 330 APPENDIX B. SOURCES OF FURTHER INFORMATION 332 Books, 332 Periodicals, 337 Addresses. 340 INDEX 345