

International Handbook of Pollution Control

Edited by Edward J. Kormondy

International Handbook of Pollution Control

Edited by Edward J. Kormondy



Greenwood Press
NEW YORK • WESTPORT, CONNECTICUT • LONDON

Library of Congress Cataloging-in-Publication Data

International handbook of pollution control.

Bibliography: p.

Includes index.

1. Pollution—Government policy. 2. Pollution—Law and legislation. 3. Pollution—Economic aspects.

I. Kormondy, Edward John, 1926—

HC79.P55144 1989 363.73'56 88-5691

ISBN 0-313-24017-5 (lib. bdg. : alk. paper)

British Library Cataloguing in Publication Data is available.

Copyright © 1989 by Edward J. Kormondy

All rights reserved. No portion of this book may be reproduced, by any process or technique, without the express written consent of the publisher.

Library of Congress Catalog Card Number: 88-5691

ISBN: 0-313-24017-5

First published in 1989

Greenwood Press, Inc.

88 Post Road West, Westport, Connecticut 06881

Printed in the United States of America



The paper used in this book complies with the Permanent Paper Standard issued by the National Information Standards Organization (Z39.48-1984).

10 9 8 7 6 5 4 3 2 1

PREFACE

In undertaking this project more than five years ago, I was persuaded that a niche in the then available literature was unfilled, namely, that concerning a broad survey of the regulation of air, water, and soil pollution and of toxic substances in industrialized and developing countries of both socialist and capitalist bent. As most readers of this volume already know, contamination is no respecter of the artificial boundaries that define most nations; pollutants in the air or water do not stop when the atmosphere or rivers cross into another country. The juxtaposition of boundaries and the commonality of pollution impose an internationalization of awareness and implore a mutuality of coordinated response. Although, as this volume will attest, considerable progress has been made both within and between sovereign states, various factors, almost exclusively parochially economic and political in final measure, have stayed the commonness of attack that transboundary pollution problems demand.

Invitations to participate in this project were extended to a number of persons known or recommended as being knowledgeable about pollution problems in their respective countries. Such cognizance is not restricted to the scientific community, and thus it is refreshing to note that a number of the chapters were prepared by members of the legal profession and those with political science strengths. Some of the authors were known to me from having prepared for the same publisher the *Handbook on Contemporary Developments in World Ecology* (1981). In other cases, I relied on the good graces of some of those previous contributors, as well as other colleagues, to recommend individuals or organizations knowledgeable in the field and able to recommend potential authors from different countries. In addition, I sought, through various sources, individuals capable of developing integrative essays of broader scope.

As a result of these efforts, twenty-four countries of broad geographic coverage

are represented in this volume. In addition, a broadly cast introductory chapter and an integrative one on international regulation complete the text. Following the chapters are lists of resource literature, abstracting and bibliographic services, organizations, and journals concerned with pollution and pollution control.

An additional six individuals did not respond to my several letters of invitation to participate in the project. Seven additional persons contracted to develop articles failed to do so. This accounts for the absence of essays from Brazil, Egypt, France, Indonesia, Israel and an integrative essay on the effects of de-regulation on pollution abatement. While recognizing that preparing such essays is essentially "voluntary" work, I admit to considerable disappointment concerning those who failed to fulfill their obligations in time to allow for possible alternate author recruitment.

Each author was asked to address the following points insofar as they pertained in a chapter approximating five thousand words: historical antecedents and the impetus for pollution control; major pollution problems from a regional, national, and transboundary perspective; national and other policies; and implementation, including the role of governmental and nongovernmental agencies or groups, the prioritization of issues, fines and incentives, and prohibitions and liability. Each was asked also to provide, in addition to the standard citing of references, lists of organizations, journals, source books, and bibliographic and abstracting services pertinent to his or her country. Differing intra-nation conditions and resulting emphases, as well as the particular perspective of the authors, resulted in chapters that are unique rather than stereotyped; yet each, in its way, encompasses the intended outline. All chapters were edited to provide consistency in styling and language.

The chapters have been arranged according to major world regions and are in alphabetical order within a region. The thematic chapters introduce the volume.

This project could not have been completed without the willingness of these authors to prepare their respective contributions without monetary compensation. I am grateful and indebted to them and express appreciation for the timeliness with which most completed their task. I also acknowledge the assistance of the many persons in various countries who assisted in identifying potential authors. In this regard, I particularly single out my colleague J. Frank McCormick of the University of Tennessee. Cornelia Balogh, reference librarian at California State University-Los Angeles, did yeoman's service in ferreting out lists of organizations and governmental agencies that were subsequently contacted for identification of potential authors. Kenneth Herrick, Director of the University of Hawaii-Hilo Library, provided invaluable service in tracking down incomplete references and other bits of information. To all of the people who contributed in different ways, I express my appreciation. I believe that, collectively, they have provided a most worthwhile contribution to an understanding of the current state of pollution control.

Edward J. Kormondy

CONTENTS

TABLES	xiii
PREFACE	xv
1. Introduction <i>Posanyi J. Madati and Edward J. Kormondy</i>	1
The Nature of Pollution	1
Role of Extranational Stimuli	13
Individuals and Organizations	17
2. International Aspects of Pollution Control <i>Allen L. Springer</i>	19
Past State Practice	19
The Stockholm Conference on the Human Environment	22
Post-Stockholm Developments	24
Conclusion	30
Notes	31
THE AMERICAS	35
3. Argentina <i>Gloria M. A. Dominguez and Beatriz A. D. Lukez</i>	37
Historical Background and Moves toward Pollution Control	38
Major Problems of Pollution	40

Environmental Legislation	47
Implementation	50
Acknowledgments	53
Bibliography	53
4. Canada <i>James W. Moore</i>	57
Major Environmental Problems	58
National and Provincial Policies	63
Implementation	65
Acknowledgments	69
References	69
5. Costa Rica <i>Luis A. Fournier-Origgi and Manuel Chavarría</i>	71
Major Pollution Problems	73
National and Other Policies	80
Liability of Damage Suits	83
Role of Nongovernmental Associations	84
Priority of Issues	85
References	85
6. Mexico <i>Enrique Riva Palacio</i>	87
Historical Antecedents and Impetus for Pollution Control	87
Major Pollution Problems	91
National and Other Policies	93
Bibliography	94
7. United States <i>John M. Neuhold</i>	95
Historical Antecedents and Traditions	95
Major Pollution Problems	99
National and Other Policies	102
Regulatory Strategies and Implementation	105
References	112
Bibliography	112
8. Venezuela <i>Roger J. Carrillo</i>	113
Historical Antecedents and Impetus for Pollution Control	113

Major Pollution Problems in Venezuela	115
National and Other Policies	121
Implementation	123
Acknowledgment	125
References	125
Bibliography	129
EUROPE	135
9. Czechoslovakia <i>Jaroslav Hrbáček, Bedrich Binek, and Václav Mejstřík</i>	137
Historical Development of Pollution and Its Control	137
Major Pollution Problems	140
National Policies of Environmental Pollution	143
Implementation	146
References	150
10. Federal Republic of Germany <i>Hans-Jürgen Jäger, Karl Friedrich Wentzel, and C. Jeffrey Brandt</i>	153
Historical Antecedents and Impetus for Pollution Control	153
Major Pollution Problems	154
National and Other Policies	167
Implementation	169
References	170
Bibliography	170
11. Greece <i>Glykeria P. Sioutis</i>	171
The Legal Notion of the Environment and Protection of the Environment	171
Aspects of Protection of the Environment	172
Administrative Structures for Protection of the Environment	175
Sanctions	176
Principal Provisions for Protection of the Environment	177
Bibliography	177
12. Hungary <i>Imre Szebényi and György Pálmai</i>	179
Historical Antecedents and Impetus for Pollution Control	179
Major Pollution Problems	182

National Policy	187
Implementation	193
Acknowledgments	197
13. Italy <i>Roberto Marchetti</i>	199
History of and Impetus for Pollution Control	199
Major Pollution Problems	202
National and Other Policies	205
Implementation	207
References	207
14. Norway <i>Kjell Baalsrud</i>	209
Development of Pollution Control	209
Major Pollution Problems	211
National and Other Policies	215
Implementation	216
Acknowledgments	218
15. Sweden <i>Göran A. Persson</i>	219
Historical Antecedents and Impetus for Pollution Control	219
Major Pollution Problems	220
National and Other Policies	222
Implementation	229
Bibliography	232
16. United Kingdom of Great Britain and Northern Ireland <i>Malcolm John Forster</i>	233
Historical Antecedents and Impetus for Pollution Control	233
Major Pollution Problems	235
National and Other Policies	237
Implementation	244
Notes	245
OCEANIA	249
17. Australia <i>Alan Gilpin</i>	251
Overview and Historical Background	251

Major Pollution Problems	254
Federal and State Policies	256
Ministerial Bodies	268
Summary of Achievements	269
18. New Zealand <i>Philip Tortell</i>	271
Most Significant Pollution Problems	272
Legislation and Other Regulatory Provisions	275
Administrative Responsibilities	278
Future Prospects	280
Acknowledgments	281
References	281
AFRICA	283
19. Nigeria <i>James Kolawole Egunjobi</i>	285
Domestic Waste	286
National Policies on Pollution Control	290
References	294
20. Sudan <i>Mohamed El Mahdi Beshir and Mohamed Obeid Mubarek</i>	297
History of Environmental Concern	298
Pollution in the Modern Sector	299
The Ecological Imbalance	304
Pollution Control	305
References	307
21. Tanzania <i>Posanyi J. Madati</i>	309
Major Pollution Problems	310
National and Other Policies for Controlling Pollution	311
Implementation	315
ASIA	321
22. Japan <i>Tsumugu Totsuka</i>	323
Historical Antecedents and Impetus for Pollution Control	323

Major Pollution Problems	324
National and Other Policies	326
Implementation	330
References	334
Bibliography	334
23. Korea <i>Kye Chil Oh</i>	337
Background	337
Major Pollution Problems	339
National and Other Policies	348
Implementation	349
Conclusion	354
Acknowledgments	354
References	354
Bibliography	356
24. People's Republic of China <i>Rui-Lin Jin and Zheng-Kang Cheng</i>	357
Historical Antecedents and Impetus for Pollution Control	357
Major Environmental Problems	359
National and Other Policies	361
Implementation	374
25. Singapore <i>Kuan-Hon Chow</i>	377
Historical Antecedents and Impetus for Pollution Control	377
Major Pollution Problems	378
National Policies	381
Implementation	385
Acknowledgment	390
References	390
Bibliography	392
26. Taiwan <i>Tsu-Chang Hung and Chang-Hung Chou</i>	393
Background	393
Air Pollution	394
Water Pollution	395

Municipal, Industrial, and Radioactive Wastes	400
References	402
APPENDIX A: Journals and Periodicals Dealing with Pollution and Pollution Control	405
APPENDIX B: Organizations Concerned with Pollution and Pollution Control	413
APPENDIX C: Bibliographic and Abstracting Services on Pollution and Pollution Control	433
Source Books on Pollution and Pollution Control <i>Edward J. Kormondy</i>	439
ABOUT THE CONTRIBUTORS	447
INDEX	461

TABLES

1.1	Examples of Environmental Problems	3
1.2	Examples of Pollutants	4
1.3	Poisoning by Environmental Pollutants in Japan	11
1.4	United Nations Agencies Dealing with Environmental Pollution and Control	14
4.1	New Oil Resources in Canada	61
4.2	Number of Environmental Acts Administered by the Governments of Canada	66
5.1	Classification of the Importance of Pollution by Inhabitants of the Metropolitan Area of San Jose according to Educational Level	74
5.2	Importance Given to the Four Problems That Rank in the First and Second Places of Importance in the Country	75
5.3	Principal Watersheds Affected by Organic Wastes	75
5.4	Amounts of Detergents Found in Principal Rivers of the Central Valley, Costa Rica	76
5.5	Variation in Number and Importance of Insect Species Affecting Cotton Plantations in Nicaragua	79
7.1	Federal Legislation Dealing with the Control of Radionuclides in the Environment	105
7.2	Summary of Penalties for Criminal Violation of Pollution Control Acts	111
10.1	Forest Damage by Damage Class	156
10.2	Ozone Concentrations ($\mu\text{g}/\text{m}^3$) at Selected Monitoring Sites in the Federal Republic of Germany in 1982	157
10.3	Annual Emissions of Sulfur Dioxide	160

10.4	Annual Emissions of Nitrogen Oxides (as NO ₂)	161
10.5	Annual Emissions of Organic Compounds	161
10.6	Sulfur Emission (1978) and Annual Sulfur Deposition (October 1978–September 1980) in Europe Based on Model Calculations	162
10.7	Water Quality Based on Various Parameters at Different Monitoring Sites of the North Sea Research Program	165
10.8	Amount of Waste Collected in Domestic Waste Disposal Programs	166
12.1	Effluent Standards and Fining Rates	190
22.1	Ratio of Samples Exceeding Environmental Quality Standards in Terms of Toxic Substances	327
22.2	Ambient Air Quality Standards	329
22.3	Environmental Quality Standards Relating to the Protection of Human Health	330
25.1	Air Pollution Level at Normal Temperature and Pressure in Singapore during the Past Decade (1974–1983)	380
25.2	Singapore's Environmental Legislation and Regulations	382

Posanyi J. Madati
Edward J. Kormondy

THE NATURE OF POLLUTION

Human activities inevitably and increasingly bring about a redistribution of materials and energy in the environment. When such redistribution, initiated by human or other activities, endangers or is likely to endanger human health or well being or human resources, it can be termed *pollution*. For instance, water vapor can hardly be regarded as a pollutant, but if the emission of water vapor in the atmosphere in sufficient amounts were to befog a wide area of a city and its highways, it could be considered a pollutant. Some pollutants can be entities in the wrong place at the wrong time; other pollutants are entities created anew that function contrary to the interests of an ecological system.

According to most dictionary definitions, to pollute is to make or render unclean, to defile, desecrate, and profane. In November 1965 the Environmental Pollution Panel of the President's Science Advisory Committee defined pollution as follows:

Environmental pollution is the unfavorable alteration of our surroundings, wholly or largely as a by-product of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms. These changes may affect man directly, or through his supplies of water and of agricultural and other biological products, his physical objects or possessions, or his opportunities for recreation and appreciation of nature.

Pollutants are introduced by natural phenomena such as forest fires, volcanic eruptions, floods, collapsing river banks, or dams, as well as by nearly all human activities, exacerbated by urbanization and industrialization. As suggested by the definition above, pollutants fall into several major categories: chemical sub-

stances such as organochlorine compounds or radionuclides; geochemical substances such as dust, particulate matter, or sediments; biological agents such as bacteria, viruses, parasites, fungi, or molds; and physical agents such as noise and waste heat.

Pollution Problems and Pollution Effects

An overview of the environmental harm caused by pollution is shown in Table 1.1. Not surprisingly, the major victims of environmental pollution are humans, directly or indirectly. Because of the nature of environmental processes, whatever gets into the air or water or onto the land invariably has the potential for affecting the human ecosystem. Table 1.2 demonstrates this concept using examples of air pollutants.

As the pages of this volume will amply demonstrate, pollution of the air, water, and soil, whether locally or distantly produced, renders detrimental effects on the environment physically and culturally as well as from a health perspective. By its very nature, human activity results in by-products; alone or in combination with other by-products, the result is contamination of the environment. What the various authors in this book convey are the attempts by fiat as well as plea to control if not eliminate the potential harmful effects of these activities. The consensus is that it is far more effective and efficient to control than to correct the untoward effects of pollution.

Historical Occurrences of Environmental Problems

Environmental pollution is not an occurrence of the recent past or the period since the onset of industrialization in the middle of the nineteenth century. Air pollution is certainly as old as the first use of fire and the dust storms that assuredly occurred on Earth long before the advent of *Homo sapiens*. The agricultural revolution and industrialization have truly exacerbated the problems of pollution, these having been well documented. But they indeed have been chronicled much earlier.

As early as 361 B.C. Theophrastus, sometimes acknowledged as the first environmentalist, proclaimed that fossil substances called coals burn for a long time, but their smell is "troublesome and disagreeable." In 65 B.C. the poet Horace lamented that the shrines of Rome were being blackened by smoke.

Promulgation of the first smoke-abatement law occurred in 1273 to protect Edwardian England from risks to human health. Soon afterward, in 1306, a royal proclamation was signed banning the burning of coal in London. When an industry owner disobeyed this royal proclamation, he was tried, found guilty, and beheaded!

In 1666 an Englishman petitioned the king of England that lime burners and soap boilers be removed from London because their industrial processes were polluting the atmosphere. Some 286 years later, the London fog or smog disaster

Table 1.1
Examples of Environmental Problems

Problem/Situation	Primary Pollution			Typical Harmful Effects On Man
	Air	Soil	Water	
Pollution of surface waters	X		X	Human health
Pollution of underground waters			X	Human health
Biological accumulation of toxins	X	X	X	Human health, food chains and supply
Toxicity to man	X	X	X	Human health
Toxicity to terrestrial flora and fauna	X	X		Human health, food supply and raw materials supply
Toxicity to aquatic flora and fauna	X		X	Human health, food supply and amenities
Agricultural and horticultural practices	X	X	X	Human health, food and raw material supply
Other industrial practices	X	X	X	Human health, food and raw material supply
Disposal of wastes	X	X	X	Human health, food and raw material supply
Effects on ozone layer	X			Various long term effects
Usage of land	X	X	X	Human health, food and raw material supply
Effects on weather	X	X	X	Various long and short term effects
Reduction of sunlight	X			Human health, food and raw material supply
Interference to navigation			X	Raw material supply and amenities
Interference to aquatic sports			X	Amenities
Odors	X	X	X	Human health or nuisance and amenities
Damage to property	X	X	X	Human health and life and amenities