

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 The Development of Environmental Models	3
1.2 Scope of the Book	6
1.3. State of the Art of Modeling	7
1.4. How to Use the Handbook	10
2. BIOGEOCHEMICAL MODELS OF AQUATIC ECOSYSTEMS	11
2.1 Characteristics of Models for Aquatic Ecosystems	13
2.2 An Overview of Models for Rivers and Streams	14
2.3 Models of Rivers and Streams	18
2.4. An Overview of Models for Lakes and Reservoirs	34
2.5 Models for Lakes and Reservoirs	40
2.6 Overview of Marine Models	94
2.7 Marine Models	97
2.8 Overview of Models of Wetlands	127
2.9 Models of Wetlands	129
2.10 Overview of Groundwater Models	147
2.11 Groundwater Models	148
2.12 Models of Waste Water Treatment Plants, An Overview	157
2.13 Waste Water Models	159
3. BIOGEOCHEMICAL MODELS IN ECOTOXICOLOGY	163
3.1 Introduction	165
3.2 Characteristic Features and Classification of Ecotoxicological Models	166
3.3 The Application of Models in Ecotoxicology	175
3.4 An Overview of Pesticides Models	176
3.5 Models of Pesticides	180
3.6 An Overview: Models of Other Toxic Organic Compounds	194
3.7 Models of Other Organic Compounds	199
3.8 An Overview: Models of Heavy Metals, Radionuclides and Other Inorganic Compounds in the Environment	222
3.9 Models of Heavy Metals, Radionuclides and Other Inorganic Compounds in the Environment	226

4. MODELS OF TERRESTRIAL ECOSYSTEMS	249
4.1 General Considerations on Modeling Terrestrial Ecosystems	251
4.2. An Illustration: A Complex Hierarchical Model	254
4.3 Growth Equations	264
4.4. Overview of Agricultural Models	267
4.5 Agriculture Models	273
4.6. An Overview of Forestry Models	328
4.7 Forestry Models	334
4.8. An Overview: Models of Other Terrestrial Ecosystems	366
4.9 Models of Other Terrestrial Ecosystems	370
5. MODELS OF ATMOSPHERIC POLLUTION AND CLIMATE	401
5.1 General Considerations on Modeling Air Pollution and Climatic Changes	403
5.2 Models of the Distribution and Effect of Acidic Rain	405
5.3. Plume Dispersion	420
5.4 An Overview: Models of Air Pollution	430
5.5 Models of Air Pollution	434
6. LANDSCAPE MODELS AND MODELING TOOLS	451
6.1 Introduction	453
6.2 An Overview: Models of Regions and Landscape	453
6.3 Models of Regions and Landscape	457
6.4 An Overview: Auxiliary Models as Modeling Tools	477
6.5 Auxiliary Models as Modeling Tools	480
7. MODELING POPULATION DYNAMICS	499
7.1 Introduction	501
7.2 Interaction between Populations	507
7.3 Modeling Age Structure for Management of Natural Resources	512
7.4 Modeling the Primary Production/the Photosynthesis: An Overview	516
7.5 Models for the Primary Production and the Photosynthesis	525
7.6 An Overview of Modeling Population Dynamics	564
7.7 Population Dynamic Models	570
REFERENCES	645
INDEX	649