

WATER ENCYCLOPEDIA



Water Quality and Resource Development

Edited by
JAY H. LEHR
JACK KEELEY

CONTENTS

<i>Preface</i>	<i>ix</i>	Trace Element Contamination in Groundwater of District Hardwar, Uttaranchal, India	143
<i>Contributors</i>	<i>xi</i>	Iron Bacteria	149
Water Quality Control		Cartridge Filters for Iron Removal	152
Acid Mine Drainage—Extent and Character	1	Irrigation Water Quality in Areas Adjoining River Yamuna At Delhi, India	155
The Control of Algal Populations in Eutrophic Water Bodies	2	Water Sampling and Laboratory Safety	161
Arsenic Compounds in Water	7	Municipal Solid Waste Landfills—Water Quality Issues	163
Arsenic Health Effects	15	Land Use Effects on Water Quality	169
Background Concentration of Pollutants	18	Monitoring Lipophilic Contaminants in the Aquatic Environment using the SPMD-TOX Paradigm	170
Waterborne Bacteria	20	Use of Luminescent Bacteria and the <i>Lux</i> Genes For Determination of Water Quality	172
Water Assessment and Criteria	24	Water Quality Management	176
Physiological Biomarkers and the Trondheim Biomonitoring System	28	Water Quality Management and Nonpoint Source Control	184
Biomarkers, Bioindicators, and the Trondheim Biomonitoring System	29	Water Quality Management in an Urban Landscape	189
Active Biomonitoring (ABM) by Translocation of Bivalve Molluscs	33	Water Quality Management in the U.S.: History of Water Regulation	193
Biochemical Oxygen Demand and Other Organic Pollution Measures	37	Water Quality Management in a Forested Landscape	199
Biodegradation	41	Trace Metal Speciation	202
Bioluminescent Biosensors for Toxicity Testing	45	Metal Ion Humic Colloid Interaction	205
Bio-manipulation	50	Heavy Metal Uptake Rates Among Sediment Dwelling Organisms	211
Genomic Technologies in Biomonitoring	58	Methemoglobinemia	219
Macrophytes as Biomonitoring of Trace Metals	64	Microbial Activities Management	223
Biosorption of Toxic Metals	68	Microbial Dynamics of Biofilms	228
Bromide Influence on Trihalomethane and Haloacetic Acid Formation	74	Microbial Enzyme Assays for Detecting Heavy Metal Toxicity	233
Activated Carbon: Ion Exchange and Adsorption Properties	79	Microbial Forms in Biofouling Events	239
Activated Carbon—Powdered	86	Microbiological Quality Control in Distribution Systems	243
Chlorination	88	Water Quality Models for Developing Soil Management Practices	248
Chlorination By-Products	91	Water Quality Modeling—Case Studies	255
Classification and Environmental Quality Assessment in Aquatic Environments	94	Field Sampling and Monitoring of Contaminants	263
Coagulation and Flocculation in Practice	98	Water Quality Models: Chemical Principles	269
Colloids and Dissolved Organics: Role in Membrane and Depth Filtration	99	Water Quality Models: Mathematical Framework	273
Column Experiments in Saturated Porous Media Studying Contaminant Transport	103	Environmental Applications with Sub-mitochondrial Particles	278
Cytochrome P450 Monooxygenase as an Indicator of PCB/Dioxin-Like Compounds in Fish	106	Interest in the Use of an Electronic Nose for Field Monitoring of Odors in the Environment	281
Water Related Diseases	111	Oil-Field Brine	284
Dishwashing Water Quality Properties	112	Oil Pollution	290
Disinfection By-Product Precursor Removal from Natural Waters	115	Indicator Organisms	292
Alternative Disinfection Practices and Future Directions for Disinfection By-Product Minimization	118	pH	294
Water Quality Aspects of Dredged Sediment Management	122	Perchloroethylene (PCE) Removal	299
The Economics of Water Quality	127	A Primer on Water Quality	301
Understanding <i>Escherichia Coli</i> O157:H7 and the Need for Rapid Detection in Water	136	Overview of Analytical Methods of Water Analyses With Specific Reference to EPA Methods for Priority Pollutant Analysis	304
Eutrophication and Organic Loading	142	Source-Water Protection	311
		Protozoa in Water	313

Water Quality	314	California—Continually the Nation's Leader in	
Water Quality	316	Water Use	478
Emerging and Recalcitrant Compounds in		Lessons from the Rising Caspian	480
Groundwater	316	Institutional Aspects of Water Management in	
Road Salt	319	China	484
Review of River Water Quality Modeling		Will Water Scarcity Limit China's Agricultural	
Software Tools	325	Potential?	488
River Water Quality Calibration	331	Water and Coastal Resources	489
<i>Salmonella</i> : Monitoring and Detection in		Water Use Conservation and Efficiency	489
Drinking Water	337	Conservation of Water	495
Lysimeter Soil Water Sampling	340	The Development of American Water Resources:	
Regulatory and Security Requirements for		Planners, Politicians, and Constitutional	
Potable Water	343	Interpretation	498
A Weight of Evidence Approach to Characterize		Water Markets: Transaction Costs and	
Sediment Quality Using Laboratory and Field		Institutional Options	499
Assays: An Example For Spanish Coasts	350	Averting Water Disputes	501
Remediation and Bioremediation of		Water Supply and Water Resources: Distribution	
Selenium-Contaminated Waters	355	System Research	509
Shellfish Growing Water Classification	360	Drought in the Dust Bowl Years	511
Sorptive Filtration	362	Drought Management Planning	514
Quality of Water in Storage	367	Drought and Water Supply Management	515
Quality of Water Supplies	370	Assessment of Ecological Effects in	
The Submitochondrial Particle Assay as a		Water-Limited Environments	516
Biological Monitoring Tool	376	Reaching Out: Public Education and Community	
Microscale Test Relationships to Responses to		Involvement in Groundwater Protection	518
Toxicants in Natural Systems	379	Integration of Environmental Impacts into	
Toxicity Identification Evaluation	380	Water Resources Planning	520
Whole Effluent Toxicity Controls	382	The Expansion of Federal Water Projects	522
Development and Application of Sediment		Flood Control History in the Netherlands	524
Toxicity Tests for Regulatory Purposes	383	Food and Water in an Emergency	526
Algal Toxins in Water	387	Water Demand Forecasting	529
Ground Water Quality in Areas Adjoining River		Remote Sensing and GIS Application in Water	
Yamuna at Delhi, India	392	Resources	531
Chlorine Residual	398	Globalization of Water	536
Source Water Quality Management	399	Water Science Glossary of Terms	541
Dose-Response of Mussels to Chlorine	401	Harvesting Rainwater	548
Metallothioneins as Indicators of Trace Metal		Urban Water Resource and Management in	
Pollution	406	Asia: Ho Chi Minh City	552
Amphipod Sediment Toxicity Tests	408	Hydropower—Energy from Moving Water	554
Ciliated Protists as Test Organisms in Toxicity		Water Markets in India: Economic and	
Assessment	413	Institutional Aspects	555
SOFIE: An Optimized Approach for Exposure		Water Resources of India	559
Tests and Sediment Assays	418	Water Infrastructure and Systems	567
Passive Treatment of Acid Mine Drainage		Overview and Trends in the International Water	
(Wetlands)	423	Market	568
Biomarkers and Bioaccumulation: Two Lines of		Best Management Practices for Water Resources	570
Evidence to Assess Sediment Quality	426	Integrated Water Resources Management	
Lead and its Health Effects	432	(IWRM)	574
Microbial Detection of Various Pollutants as an		Management of Water Resources for Drought	
Early Warning System for Monitoring of		Conditions	576
Water Quality and Ecological Integrity of		Water Resources Management	586
Natural Resources, in Russia	440	NASA Helping to Understand Water Flow in the	
Luminescent Bacterial Biosensors for the Rapid		West	587
Detection of Toxicants	453	Transboundary Water Conflicts in the Nile	
Development and Application of Sediment		Basin	590
Toxicity Test for Regulatory Purposes	458	Planning and Managing Water Infrastructure	594
E_h	464	Application of the Precautionary Principle to	
		Water Science	595
Water Resource Development and Management		Water Pricing	603
Water Resources Challenges in the Arab World	470	Spot Prices, Option Prices, and Water Markets	606
Effluent Water Regulations in Arid Lands	475	Water Managed in the Public Trust	608

Water Recycling and Reuse: The Environmental Benefits	610	How We Use Water in These United States	650
State and Regional Water Supply	613	Valuing Water Resources	653
River Basin Decisions Support Systems	619	Water—Here, There, and Everywhere in Canada	656
Water Resource Sustainability: Concepts and Practices	624	Water Conservation—Every Drop Counts in Canada	660
The Provision of Drinking Water and Sanitation in Developing Countries	630	Ecoregions: A Spatial Framework for Environmental Management	667
Sustainable Management of Natural Resources	633	Flood of Portals on Water	668
Sustainable Water Management On Mediterranean Islands: Research and Education	638	Fuzzy Criteria for Water Resources Systems Performance Evaluation	674
Meeting Water Needs in Developing Countries with Tradable Rights	643	Participatory Multicriteria Flood Management	678
Water Use in the United States	645	Water Resources Systems Analysis	683
		Index	689