## Contents

List of Contributors	Page x
List of Figures List of Tables	xi xiv
<ol> <li>Introduction K. J. Gregory and D. E. Walling</li> <li>1.1 A Century of Milestones</li> <li>1.2 A Decade of Papers</li> <li>1.3 A Decade of Readings</li> <li>1.4 A Book for Processes</li> </ol>	1 2 3 5 6
ATMOSPHERE	
<ul> <li>2 The Radiation Balance D. Greenland</li> <li>2.1 The Radiation Environment</li> <li>2.2 Radiation: Its Nature, Flow, and Balance</li> <li>2.3 Natural Alteration of the Radiation Balance</li> <li>2.4 The Human Influence on the Radiation Balance</li> <li>2.4a The local scale</li> <li>2.4b The regional scale</li> <li>2.4c The global scale</li> <li>2.5 The Future</li> </ul>	11 11 12 15 17 17 17 18 20 21
<ul> <li>3 Precipitation B. W. Atkinson</li> <li>3.1 Introduction</li> <li>3.2 Precipitation Mechanisms</li> <li>3.3 Conscious Modification of Precipitation</li> <li>3.3 Increasing rainfall and snowfall</li> <li>3.3 b Hail suppression</li> <li>3.3 c Non-meteorological effects of cloud seeding</li> <li>3.4 Unconscious Modification of Precipitation</li> <li>3.5 Conclusion</li> </ul>	23 23 23 24 25 27 28 29 35
<ul> <li>4 Man-Modified Climates W. R. Rouse</li> <li>4.1 Introduction</li> <li>4.2 Basic Principles</li> <li>4.3 Man-Made Lakes</li> <li>4.4 Forest Removal</li> <li>4.5 Climate and Spreading Deserts</li> <li>4.6 Impact of Urbanization and Industrialization</li> <li>4.7 Conclusion</li> </ul>	38 38 39 42 46 48 49 52

HY	YDRO	DSPHERE	
5	Hydrological Processes D. E. Walling		
	5.1	Introduction	57
	5.2	Process Modifications	58
	5.3	Catchment Studies and Experiments	63
	5.4	Evidence from Catchment Studies	66
		5.4a Land clearance	66
		5.4b Land drainage	68
		5.4c Recreational pressure	68
		5.4d Strip mining	68
		5.4e Conservation measures	69
		5.4f Urbanization	69
	5.5	Quality as Well as Quantity	71
		5.5a Vegetation removal	72
		5.5b Soil disturbance	74
		5.5c Building activity	75
		5.5d Irrigation	75
		5.5e Nonpoint pollution	77
	5.6	Problems and Prospects	77
6	Coastal Processes E. C. F. Bird		82
	6.1	Introduction	82
	6.2		83
	6.3	Effects of Sea Walls	83
	6.4	Effects of Breakwaters	89
	6.5	Effects of Dredging and Dumping	94
	6.6	Effects of Sedimentological Changes	96
	6.7	Effects of Vegetation	99
	6.8	Conclusions	100
L	ітно	SPHERE	
7		es and Weathering M. J. Selby	105
	7.1	Introduction	105
	7.2	Factors Controlling Erosion	106
		7.2a Erosivity	107
		7.2b Erodibility	110
	7.3	Landsliding	110
		7.3a Shallow translational landslides	110
		7.3b Effects of vegetation upon slope stability	112
		7.3c Effects of landsliding on valley floors	114
	7.4	Periodicity of Extreme Events on Slopes	116
	7.5	Slopes in Urban Areas	119
	7.6	Denudation and Land-use Planning	120

		CONTENTS	vii
8	River Channels K. J. Gregory		123
	8.1	Introduction	123
	8.2	Down the River	125
		8.2a Direct modifications of processes	125
		8.2b Indirect modifications of channel processes	127
	8.3	River channel reaction	128
		8.3a Adjustments of river channel cross sections	131
		8.3b Changes of river channel planform	135
		8.3c Drainage network adjustments	136
	8.4	Restraining Rivers	138
		8.4a Consequences of channelization	139
		8.4b Integrated approaches	140
	8.5	Prospects for Rivers and Man	140
9		afrost and Ground Ice Hugh M. French	144
	9.1	Introduction to Permafrost Distribution and Problems	144
	9.2	Ground Ice and Thermokarst	147
	9.3 Terrain Disturbances		150
		Engineering and Construction Problems	155
		Hydrologic Problems	158
	9.6	Conclusion	160
10		surface Influences D. R. Coates	163
	10.1	Introduction	163
	10.2	Loading Effects	164
		10.2a Dams and reservoirs	164
		10.2b Water injection	166
		10.2c Irrigation	167
		10.2d Buildings and structures	168
	10.3	Withdrawal Effects	169
		10.3a Groundwater mining	169
		10.3b Oil and gas production	174
		10.3c Mining of solids	175
	10.4		180
		10.4a Construction for roads, buildings, resources and services	180
		10.4b Reclamation	183
	10.5	8	184
		10.5a Expansive sediments and rocks	184
		10.5b Dynamite and nuclear explosions	186
	10.6	Conclusion	186

PEI	OSPH	IERE	
11	Soil P	rofile Processes S. Trudgill	191
	11.1	Introduction	191
	11.2	Soil Profiles and Man in the Past	194
		11.2a Soils and wartime pressures in Britain	194
		11.2b Soil organic profiles on Exmoor	194
		11.2c Soil mineral profiles on Romney Marsh	196
	11.3	Soil Profiles and Man in the Present	197
		11.3a The soil structure profile	197
		11.3b Soil profile pollution: pesticides and herbicides	198
		11.3c Soil profile pollution: heavy metals	200
		11.3d Soil profile pollution: fertilizers	201
		11.3e Soil profiles and conifer plantations	203
		11.3f Soil profiles and society	204
	11.4	Conclusion	205
12	Soil H	Crosion and Conservation R. B. Bryan	207
	12.1	Introduction	207
	12.2	Water Erosion	208
	12.3	Assessing Erosion Hazard	210
	12.4	Conservation Practices	211
		12.4a Crop management	212
		12.4b Mechanical protection practices	213
		12.4c Control of gully erosion	215
	12.5	Wind Erosion	217
	12.6	Prevention of Wind Erosion	218
		12.6a Crop management and tillage	218
		12.6b Windbreaks and shelterbelts	219
	12.7	Conclusion	220
DIC	OSPHE	DE	
13		stems and Communities: Patterns and Processes Carolyn M. Harrison	225
15	13.1	Introduction	225
	13.1	Ecosystem Patterns and Processes	227
	13.2	Ecosystem Patterns and Processes Ecosystem Dynamics Through Time	230
	13.3	Community Patterns	230
	13.5	Island Biogeography	232
	10.0	iound DioBooBrahil	238

viii

		CONTENTS	ix
14	The C	Conservation of Plants, Animals, and Ecosystems I. G. Simmons	241
	14.1	A Mosaic of Ecological Systems	241
	14.2	Anti-conservation Trends	245
		14.2a Intensification of agriculture	245
		14.2b Urbanization and industrialization	246
		14.2c War	247
		14.2d Species extinction	247
		14.2e Response to fluctuations	248
	14.3	Conservation Trends	249
		14.3a Protected landscapes and ecosystems	249
		14.3b Outdoor recreation	251
		14.3c Conservation of genetic variety	251
		14.3d Low-impact technology	252
		14.3e Soft energy paths	253
	14.4	Alternative Futures	253
		14.4a Introduction	253
		14.4b A technological future	254
		14.4c An equilibrium future	255
	14.5	Final Words	256
со	NCLU	ISION	
15	A Pe	rspective K. J. Gregory and D. E. Walling	261
	15.1	International Awareness	262
	15.2	Monitoring Programmes	263
	15.3	Environmental Impact Assessment	264
	15.4	Modelling Strategies	268
	15.5		270
Ind	ex		273