

# Contents

	List of contributors	xiii
1	<b>Peatland habitats</b>	1
	1.1 Wetlands, peatlands, and mires	2
	1.2 Peatland habitats along wetness and chemical gradients	5
	1.3 Origin of groundwater and trophic classes	6
	1.4 The main ecosystems: marsh, swamp, fen, bog	7
	1.5 Environmental gradients as a basis for a finer classification	13
	1.6 Peatland classifications	17
2	<b>Diversity of life in peatlands</b>	21
	2.1 Fungi and microorganisms	21
	2.2 Protozoa	27
	2.3 Microalgae	28
	2.4 Lichens	29
	2.5 Plants	30
	2.6 Animals	38
3	<b>Adaptations to the peatland habitat</b>	48
	WITH CONTRIBUTIONS FROM BAPTISTE REGNERY	
	3.1 Plant adaptations to flooding and anoxic conditions	48
	3.2 Plant adaptations to low nutrient availability	53
	3.3 The perfect peatland plant	60
	3.4 Adaptations in animals	63
4	<b><i>Sphagnum</i>—the builder of boreal peatlands</b>	65
	4.1 Morphology	65
	4.2 Capillarity and water-holding capacity	68
	4.3 Chemical adaptations	71
	4.4 Nutrient conservation	73
	4.5 <i>Sphagnum</i> life cycle	74
	4.6 Diversity of <i>Sphagnum</i>	75

4.7	<i>Sphagnum</i> as an environmental indicator	76
4.8	Biological interactions in <i>Sphagnum</i>	78
4.9	Dispersal and colonization	81
4.10	Dynamics and persistence in <i>Sphagnum</i> assemblages	83
<b>5</b>	<b>Peat and organic soil</b>	<b>85</b>
5.1	Sedentation versus sedimentation	86
5.2	Organic versus mineral matter content	87
5.3	Sampling the peat profile	88
5.4	Botanical composition	90
5.5	Degree of decomposition	92
5.6	Physical properties	95
5.7	Electrochemical and chemical properties	98
5.8	Interrelationships of peat properties	105
5.9	Organic soils (histosols)	107
<b>6</b>	<b>The peat archives</b>	<b>109</b>
6.1	Peat fossils	109
6.2	Other environmental indicators	116
6.3	The problem of dating profiles	118
6.4	The Blytt–Sernander scheme	121
6.5	Pleistocene peatlands	125
6.6	Wetland archaeology	125
<b>7</b>	<b>Peatland succession and development</b>	<b>127</b>
7.1	Peatland succession	127
7.2	Successional pathways	128
7.3	Processes of peatland formation	130
7.4	Ombrotrophication	140
7.5	Detailed sequences of peatland development	143
<b>8</b>	<b>Peatland hydrology</b>	<b>148</b>
8.1	Water quantity	148
8.2	Acrotelm and catotelm	155
8.3	Water balance	157
8.4	Peatlands as regulators of water flow	164
8.5	Water quality	166
8.6	Variation in water chemistry along the bog–rich fen gradient	172

9	<b>Nutrients, light, and temperature</b>	175
	9.1 Nutrients	175
	9.2 Light	189
	9.3 Temperature and other climatic factors	192
10	<b>Hydrological systems, hydromorphology, and peatland patterns</b>	199
	10.1 Hydrological systems	199
	10.2 Hydromorphologic classification	206
	10.3 The formation of peatland patterns	226
11	<b>Peatlands around the world</b>	230
	11.1 Areas of peatland	230
	11.2 Peatland areas used for agriculture, forestry, and peat harvesting	233
	11.3 A brief global survey	234
	11.4 Peatlands in Tierra del Fuego DMITRI MAUQUOY AND KEITH D. BENNETT	236
	11.5 Restiad bogs in New Zealand BEVERLEY R. CLARKSON AND BRUCE D. CLARKSON	241
	11.6 Tropical peatlands in south-east Asia ALJOSJA HOOIJER	248
12	<b>Productivity and peat accumulation</b>	254
	12.1 Biomass and productivity	254
	12.2 Decomposition	259
	12.3 Carbon flow in peatlands	264
	12.4 Peat accumulation and its limits	266
13	<b>Management, conservation, and restoration of peatlands</b>	274
	13.1 Historical development of peatland use	275
	13.2 Agriculture on peatland	276
	13.3 Forestry on peatland	278
	13.4 Peat extraction	281
	13.5 Peatland conservation	284
	13.6 Restoration, reclamation, and after-use	287
	13.7 Peatland societies and organizations	294

175	<b>14 Peatlands and climate change</b>	296
175	14.1 Carbon pools in peatlands	297
189	14.2 Greenhouse gases and radiative forcing	298
192	14.3 Methods to study environmental changes in peatland	299
5	14.4 Current carbon balance in peatlands	301
199	14.5 Effects of climate change on peatlands	302
199	14.6 Effects of drainage for forestry and agriculture	310
306	14.7 Peat harvest	312
326	14.8 Effects of climate change in permafrost regions	313
	14.9 Conclusions	314
	Glossary	317
	References	321
	Index	369
230	<b>6 The peat archives</b>	601
233	6.1 Peat fossils	601
234	6.2 Other peat archives	611
236	6.3 Peat bogs in New Zealand	611
241	6.4 Peat bogs in south-east Asia	621
248	6.5 Wetland archaeology	621
254	<b>7 Peatland productivity and peat accumulation</b>	121
254	7.1 Biomass and productivity	127
259	7.2 Decomposition	127
264	7.3 Carbon flow in peatlands	130
266	7.4 Peat accumulation and its limits	141
	7.5 Detailed sequences of peatland development	143
274	<b>8 Peatland hydrology and restoration of peatlands</b>	148
275	8.1 Historical development of peatland use	148
276	8.2 Agriculture on peatland	151
278	8.3 Forestry on peatland	157
281	8.4 Peat extraction	161
284	8.5 Peatland conservation	161
287	8.6 Restoration, reclamation, and after-use	171
294	8.7 Peatland societies and organisations	