## Contents

-	Preface po Abbreviations and units			
Chapter i The tropical environment				
1.1	The tropics			
1.2	Climate in the tropics	,		
1.3	Biogeographical regions	11		
1.4	Chapter summary	11 17		
Cha	apter 2 Hot deserts and environmental factors	18		
2.1	The Sahara Desert and arid zones of northern Africa	18		
2.2	The Namib Desert	22		
2.3	Australian deserts	27		
2.4	Environmental factors	31		
2.5	Water	31		
2.6	Limiting factors	34		
2.7	Temperature	37		
2.8	Salinity	38		
2.9	Soils and nutrients	39		
2.10	Environmental factors and plant and animal distribution	s 43		
2.11	Desertification or land degradation?	46		
2.12	Chapter summary	48		
Cha	pter 3 Grasslands and primary production	50		
3.1	Grass structure and biology	50		
3.2	Neotropical grasslands	53		
3.3	Light as an energy source	56		
3.4	Carbon dioxide uptake by plants	56		
3.5	Photosynthesis	57		
3.6	Photorespiration	58		
3.7	Photosynthetic strategies	60		
3.8	Respiration	61		
3.9	Environmental factors and photosynthesis	63		
3.10	Primary production	64		
3.11	Assessment of grassland primary production	64		
3.12	Effects of grazing on grass growth	66		
3.13	Seasonal variation in grassland primary production	67		
3.14	Primary production rates in terrestrial biomes	68		
3.15	Chapter summary	71		
Cha	pter 4 Savanna and population dynamics	72		
4.1	Fire and savanna vegetation	72		

4.2	Savannas of the world	75	
4.3	The Serengeti	78	
4.4	Savanna plants and heterogeneity	80	
4.5	Animal population dynamics in the Serengeti	81	
4.6	Herbivores and herbivory	84	
4.7	Principles of population growth	86	
4.8	Factors determining population density	91	
4.9	Density-dependent mortality factors	93	
4.10	Competition theory and the competitive exclusion		
	principle	99	
4.11	Predation	100	
4.12	Density-independent mortality factors	109	
4.13	Reproductive strategies and population growth	109	
4.14	Population age structure and life tables	110	
4.15	Key factor analysis	117	
4.16	Conservation of African wildlife	119	
4.17	Ecosystem dynamics and ecological models	121	
4.18	Chapter summary	126	
Cha	pter 5 Lakes, energy flow and biogeochemical cycling	128	
5.1	Thermal stratification	128	
5.2	Pelagic zone production	143	
5.3	Littoral zone producers and primary production	147	
5.4	The catchment area concept	152	
5.5	Aquatic consumers	154	
5.6	The biota of tropical and temperate lakes: a comparison	158	
5.7	Food chains and energy flow	159	
5.8	Food chain energetics	159	
5.9	Trophic levels	160	
5.10	Limited length of food chains	163	
5.11	Food chain efficiencies	165	
5.12	Food web dynamics	166	
5.13	Biogeochemical cycles	168	
5.14	Quantitative aspects of nutrient supply and cycling	174	
5.15	Eutrophication	177	
5.16	Aquatic resource management	182	
5.17	Chapter summary	184	
Cha	pter 6 Rivers, floodplains and estuaries: the flood-pulse		
and river continuum concepts			
6.1	Nile River	188	
6.2	Purari River	195	
6.3	Amazon River	199	
6.4	Ecological concepts	208	
6.5	Estuaries	216	
6.6	Chapter summary	219	

Cha	apter 7 Wetlands and succession	221
7.1	What are wetlands?	221
7.2	Sudd communities of Lake Naivasha	222
7.3	Rooted emergent swamps of Lake Chilwa	223
7.4	Freshwater herbaceous wetlands: structure and function	225
7.5	Swamp forests	228
7.6	Wetland zonation	229
7.7	Wetland succession	231
7.8	Ecological succession	233
7.9	Community development and assembly	233
7.10	Wetland loss and conservation	234
7.11	Chapter summary	23€
Cha	upter 8 Tropical rain forests and biodiversity	238
8.1	Biogeography of rain forests	239
8.2	Vegetation structure of tropical rain forests	242
8.3	Phenology and reproduction of tropical forest trees	245
8.4	Life-form concept of plants	247
8.5	Rain-forest animals	248
8.6	Convergent evolution	248
8.7	Plant-animal interactions	249
8.8	Co-evolution	253
8.9	Productivity and nutrient cycling in forests	254
8.10	Micro-climates and resource acquisition	256
8.11	Biological diversity	257
8.12	Why are rain forests so diverse?	262
8.13	Latitudinal gradients and species diversity	262
8.14	Gap theory	264
8.15	Patch dynamics	266
8.16	Tropical deciduous forests and ecotones	269
8.17	Low-diversity tropical rain forests	270
8.18	Deforestation and the loss of biodiversity	270
8.19	Rain-forest conservation	273
8.20	Chapter summary	278
Cha	pter 9 Mountains, zonation and community gradients	280
9.1	Tropical mountains	280
9.2	Zonation on tropical mountains	280
9.3	Vegetation zonation on Mount Wilhelm, Papua New	
	Guinea	281
9.4	Altitude zonation in Venezuela	287
9.5	Plant and animal ecophysiology: examples from Mount	
	Kenya	289
9.6	Mountain zonation	294
9.7	Variation in plant and animal communities	296
9.8	Chapter summary	298

Chapter 10 Mangroves, seagrasses and decomposition		
10.1	Mangroves of Australia and New Guinea	301
10.2	Ecological adaptations of mangroves	302
10.3	Mangrove animals	306
10.4	Mangrove productivity	309
10.5	Seagrasses	310
10.6		311
10.7	· · · · · · · · · · · · · · · · · · ·	313
10.8	1	315
10.9		316
	Decomposition in other tropical systems	317
	Coastal zone management	318
10.12	2 Chapter summary	318
Cha	pter     Coral reefs and community ecology	320
11.1	Coral reef communities	320
11.2	Coral biology	322
11.3	Coral reefs	329
	Coral reef algae	332
11.5	Coral reef herbivores	332
	Coral reef biogeography and biodiversity	336
11.7	5 65	339
11.8	Coral reef management and conservation	344
11.9	Chapter summary	348
Cha	pter 12 Isolated habitats and biogeography: islands in	
	the sea, air and land	349
12.1	Island ecosystems	349
12.2	Krakatau	349
12.3	Dispersal	352
12.4	Colonisation and community assembly	356
12.5	Island biogeography	358
12.6	Speciation	363
12.7	Extinction	368
12.8	Exotic species on islands	370
12.9	Chapter summary	372
Chapter 13 Cities and human ecology		
13.1	Jakarta, Indonesia	373
13.2	Evolution of human societies	375
13.3	World population growth	377
13.4	Food production	382
13.5	Industrialisation, natural resource use and pollution	388
13.6	Human population growth: consequences and solutions	391
13.7	Conclusions	395

395

13.8 Chapter summary

Cha	pter 14 Global ecology: biodiversity conservation, climate change and sustainable development	397
	chinate change and sustainable development	397
14.1	Temperate and tropical environments	397
14.2	Biodiversity loss	398
14.3	Biodiversity conservation	399
14.4	Global climate change	404
14.5	Sustainable development	409
14.6	Conclusions	410
14.7	Chapter summary	410
Glossary		411
References		425
Index		442