Nonequilibrium Ecology

KLAUS ROHDE

School of Environmental Sciences and Natural Resources Management, University of New England, Australia



Contents

	Acknowledgements	раде х
	Introduction	1
1	Concepts and problems	3
	Concepts of equilibrium (balance of nature) and nonequilibrium History of equilibrium and nonequilibrium ecology:	3
	some milestones in the evolution of ideas Regulation and equilibrium in ecological systems:	6
	some experiments and a critical discussion of arguments given in favour of equilibrium Nonequilibrium in populations and metapopulations:	13
	some empirical studies	17
	Defining the problem	24
2	Nonequilibrium in communities	27
	Definition and evolution of communities Equilibrium, and disturbance leading to	27
	nonequilibrium	32
	Species nonsaturation and nonequilibria	39
3	Interspecific competition: definition and effects	49
	on species Definition and types of competition, resource	77
	limitation as its main cause	49
	Effects of competition on species	52
4	Interspecific competition: effects in communities	
	and conclusion	70
	General aspects and conclusion	78

viii · Contents

5	Noncompetitive mechanisms responsible for	
	niche restriction and segregation	81
	Evidence for niche restriction even in the absence	
	of potentially interacting species, and mechanisms	
	responsible	81
	Niche segregation to ensure reinforcement of	
	reproductive barriers	85
6	Patterns over evolutionary time, present	
Ŭ	mass extinctions	9(
	The fossil record and interpretations	9(
	Recent and present extinctions	95
_	-	
7	Some detailed examples at the population/	99
	metapopulation level	95
	Reef fishes: density dependence and equilibrium in	99
	populations?	95
	Kangaroos: fluctuations in rainfall are the primary	
	determinant of population size, but there is some "regulation" by negative feedback	104
	regulation by negative recuback	10-
8	Some detailed examples at the community level	109
	Tropical rainforests: how is diversity maintained?	109
	Ectoparasites of marine fish: non-interactive unsaturated	
	communities	121
	Insects on bracken, and wasps: type I communities	
	with little evidence for interspecific competition	127
	Larval trematodes in snails: evidence for interspecific	
	competition (and predation) in infracommunities, and	
	for nonequilibrium conditions	131
9	Some detailed biogeographical/macroecological	
	patterns	133
	Island biogeography: evidence for equilibrium conditions?	130
	Inter- and intraoceanic patterns: historical events	
	and centers of diversity are important	138
	Freshwater fishes: diversity is determined by the effects	
	of latitude, area, and history, but the effect of	
	productivity is ambiguous	150
	Latitudinal diversity gradients: equilibrium and	
	nonequilibrium explanations	15.
	General global patterns in diversity	163

	Contents	· ix
10	An autecological comparison: the ecology of some Aspidogastrea	168
11	What explains the differences found? A summary,	
	and prospects for an ecology of the future	178
	What explains the differences between communities?	178
	A summary, and prospects for an ecology of the future	182
	References	189
	Taxonomic index	216
	Subject index	219