

Contents

Preface	ix
Chapter 1 An integrated approach to landscape evolution	1
Introduction	1
Key concepts	10
Background: evolutionary pathways in landscapes	15
Comparison and contrast: integrated approach to landscape evolution versus traditional approaches	25
References	28
Chapter 2 Earth surface systems as supraorganisms	37
Introduction: supraorganisms	37
State factor model	46
Ecosystem evolution	57
The upshot.....	60
References	61
Chapter 3 Observing landscape evolution.....	69
Introduction	69
Methods and approaches	70
Indicators	81
References	90
Chapter 4 It depends on the scale: scale contingency in landscape evolution	97
Overview of scale issues	97
Scale (in)dependence.....	100
Hierarchies and the vanishing point	103
Time—real and realized	110

Scale contingency	112
References	113
Chapter 5 Historical contingency in landscape evolution	117
Memory, inheritance, and legacies	117
Succession and state transitions	123
Canalization	124
Extinction and reinforcement of evolutionary pathways	125
Maturation	132
Divergence and convergence	132
Evolutionary pathways and historical trajectories	135
Summary	147
References	149
Chapter 6 Attractors and goal functions in landscape evolution	159
Introduction	159
Deterministic, single-outcome systems	164
Multiple path, multiple outcome concepts	171
Plasticity, degrees of freedom, and constraints	176
Goal functions and emergence	178
Multiple causality	186
Circular reasoning	187
Consilience?	190
References	193
Chapter 7 Thresholds, tipping points, and instability	201
Introduction	201
Thresholds in the landscape sciences	208
Lessons from the past	214
Mode switches and meta-thresholds	215

Example: a hierarchy of thresholds	218
Conclusions	221
References	222
Chapter 8 Selection and landscape evolution	227
Introduction	227
Ecosystem selection	232
Abiotic selection	233
Preferential flow.....	237
Efficiency selection	240
Selection is <i>local</i>	246
Why aren't landscapes always becoming more efficient?	249
Occam's selection.....	252
Example: Inner Bluegrass, Kentucky	254
References	261
Chapter 9 The perfect landscape	269
The perfect storm	269
The perfect landscape	271
Triangles, badasses, and axioms	273
Evolutionary creativity	280
Evolution of landscape diversity.....	291
Conclusions	295
References	295
Chapter 10 Landscape evolution and environmental change	301
Landscape evolution lessons	301
Transformational, reciprocal, emergent evolution: TREE	304
A churning urn of burning funk	306

Landscape evolution stories	307
Lower Sabine River	308
Trees and surface drainage in the Šumava Mountains	322
The last word	334
References	335
 Index	339