Contents

	Preface	page ix
	Acknowledgments	xi
1	The need for restoration	1
	The problem	1
	Human modifications	4
	Values, goods, and services of beaches and dunes	6
	The need for restoring beaches and dunes	7
	Definitions and approaches to restoration	10
	The elusiveness of a time-dependent target state	14
	Types of restoration projects	15
	Scope of book	16
2	Beach nourishment and impacts	19
	The potential for restoration	19
	General design considerations	20
	Sediment characteristics	23
	Potential negative impacts of nourishment operations	24
	Alternative practices to minimize environmental losses	
	and enhance values	36
	Alternative designs for beach fills	43
	Restoring sediment characteristics	44
	Monitoring and adaptive management	47
	Concluding statement	47
3	Dune building practices and impacts	49
	Characteristics of human-altered dunes	49
	Dunes built by aeolian transport from nourished beaches	50
	Building dunes by deposit of fill from external sources	52
	Building dunes by beach scraping	54
	Building dunes using sand fences	56

vi Contents

	Building dunes using vegetation	59
	Building dunes using multiple strategies	63
	Concluding statement	64
4	Restoring processes, structure, and functions	66
	Increasing complexity and dynamism	66
	The issue of dynamism	66
	Altering or removing shore protection structures	70
	Restricting beach raking	75
	Restricting driving on beaches and dunes	77
	Removing or altering sand-trapping fences	77
	Protecting endangered species	78
	Altering growing conditions	79
	Replacing vegetation	83
	Restoring slacks	88
	Allowing time for naturalization	90
	Determining appropriate levels of dynamism	91
	Offsite activities	92
	Concluding statement	93
5	Options in spatially restricted environments	94
	Alternative restoration outcomes	94
	Natural gradient	96
	Truncated gradient	99
	Compressed gradient	99
	Expanded gradient	101
	Fragmented and decoupled gradients	103
	Implications	104
6	A locally based program for beach and dune restoration	107
	The need for local action	107
	Gaining acceptance for natural landforms and habitats	108
	Identifying reference conditions	110
	Establishing demonstration sites	111
	Developing guidelines and protocols	114
	Developing and implementing public education programs	123
	Maintaining and evaluating restored environments	125
7	Stakeholder interests, conflicts, and co-operation	129
	Obtaining public support	129
	The need for compromise solutions	131
	Contrasts in stakeholder perceptions and values	131
	Stakeholder actions	134
	The resulting landscape	140

	Contents	vii
8	Research needs	141
	Introduction	141
	Nourishing beaches	141
	Building dunes	147
	Accommodating or controlling dynamism	148
	Options in spatially restricted environments	150
	Addressing stakeholder concerns and needs	150
	Maintaining and evaluating restored environments	152
	Concluding statement	153
	References	154
	Index	184