# CONTENTS

Preface and Acknowledgments vii  
Foreword by Carol Franklin, RLA, FASLA ix  
Foreword by Daniel E. Williams, FAIA xi  

**PART I: NATURE OF WATER**

Chapter 1: Weather 3  
1.1 Sun and Earth 3  
1.2 The Atmosphere 6  
1.3 Weather 17  

Chapter 2: Land and Water 31  
2.1 Water and Carbon Cycles 31  
2.2 Biodiversity and the Landscape 36  
2.3 Follow the Water: The Opportunity for Watershed Planning 43  

Chapter 3: Flooding 49  
3.1 Flooding from Increased Precipitation 49  
3.2 Flooding from Severe Storms 54  
3.3 Economic and Social Costs of Water-Related Natural Disasters 61  

**PART II: DESIGN WITH WATER** 67  

Chapter 4: The Natural Landscape 71  
4.1 Understanding the Natural Water Balance 71  
4.2 When the Water Balance Is Altered 74  
4.3 Soils and Vegetation 78  
4.4 Subsurface Water Movement 83  
4.5 Stream Systems, Wetlands, Riparian Zones, and Floodplains 84  

Chapter 5: The Altered Landscape 91  
5.1 When the Landscape Is Altered 91  
5.2 Altered Stream Systems and Increased Flood Damage 95  
5.3 Why Detention Does Not Solve Flooding 98  
5.4 Summary: The Natural Landscape as a Model for Resilient Design 99  

Chapter 6: Design for Inland Flooding 103  
6.1 Resilient Design for Inland Flooding 103  
6.2 Tools for Watershed Protection 125  
6.3 Communities and Buildings in Floodplains 129
### PART III: FLOOD-RESISTANT DESIGN 131

#### Chapter 7: Flood Design Analysis 135
- 7.1 Definition of Terms 135
- 7.2 Flood Elevation: Base Flood and Design Flood 143

#### Chapter 8: The Coast 151
- 8.1 Coastal Processes 151
- 8.2 Shoreline Protection 160
- 8.3 Flood Barriers and Floodgates 164
- 8.4 Summary of Coastal Protection Measures 164

#### Chapter 9: Flood Design Practices for Buildings 169
- 9.1 Overview of Flood Design 169
- 9.2 Flood Design at the Building Scale 176

### PART IV: DESIGN FOR RESILIENCE 197

#### Chapter 10: Flood-Resistant Design for Sites and Communities 199
- 10.1 Coastal Communities 199
- 10.2 Comprehensive Planning for Resilient Communities 207
- 10.3 Local Actions to Build Community Resilience 210

#### Chapter 11: Sea Level Rise 219
- 11.1 Sea Level Rise: The Issues 220
- 11.2 Sea Level Rise: Design Responses 223

#### Chapter 12: Design for Resilience 257
- 12.1 The Wave of the Future 257
- 12.2 Models for National and International Action 259
- 12.3 Design Resolution 268

Epilogue 271
Glossary 273
Index 295