

Human-Environment Interactions

Mark R. Welford • Robert A. Yarbrough

Human- Environment Interactions

An Introduction

palgrave
macmillan

Mark R. Welford
Department of Geography
University of Northern Iowa
Cedar Falls, IA, USA

Robert A. Yarbrough
Department of Geology and
Geography
Georgia Southern University
Statesboro, GA, USA

ISBN 978-3-030-56031-7 ISBN 978-3-030-56032-4 (eBook)
<https://doi.org/10.1007/978-3-030-56032-4>

© The Editor(s) (if applicable) and The Author(s) 2021

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

structuresxx / shutterstock

This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Acknowledgments

We owe much gratitude and thanks to Rachael Ballard and Joanna O'Neill at Palgrave Macmillan in London for their patience and guidance throughout this process. We would also like to thank Brian Bossak who inspired Mark to think about writing a book on human-environment. We must also express our sincere thanks and appreciation for our families' support over the many years we worked on this project. We would not have been able to complete this book without the continued support of Theresa Welford, Mary Beth Yarbrough, Isabel Yarbrough, and Eleanor Yarbrough. Thank you, and we love you!

Contents

1	Introduction	1
1.1	Anthropocene and Omnicide	3
1.2	Geographic and Environmental Concepts	6
1.3	Nature as Socially Constructed	7
1.4	Semantic Challenges to Nature and Society	8
1.5	Spatial Scales and Boundaries	10
1.6	Environmental Determinism	14
1.7	Environmentalism	14
	References	16
2	Climate	17
2.1	Climate Change Is a Game-Changer	18
2.2	Climate Facts	23
2.3	Who Is Responsible for GHGs	25
2.4	The Scale of Climate Change	29
2.5	0.5–2 °C above Pre-Industrial Levels: What Is Happening	31
2.6	Climate change Vulnerabilities	36
2.7	Nonhuman Responses to Climate Change	38
2.8	Global Limits to Growth, a Warning to Humanity	45
2.9	Climate Change Denial and Other Assorted Environmental Repudiations?	47
2.10	What Can Governments Do? What Can We Do?	50
	References	55
3	Extinctions	59
3.1	Extinction Is Forever a Game-Changer	60
3.2	Biodiversity Crises	62
3.3	Pre-1600 Extinctions	63
3.4	Oceanic Island Extinctions—Post-1600	65
3.5	Coastal Islands near Continents	71
3.6	Continental Extinctions	72
3.7	Global Extinctions	75
3.8	Emerging Crisis of Newly Threatened Species	76
3.9	Attempts to Stop Further Extinctions	80
3.10	From the Brink of Extinction	84
	References	86
4	Thresholds	91
4.1	Thresholds and Scales	92
4.2	Landscape Sensitivity and Complex Responses	93
4.3	Carrying Capacity Exceedance	97

4.4	Deforestation, Colonization, Emergence of New Diseases, and Reemergence of Known Diseases	104
4.5	Can We Prevent a Future Pandemic?	110
4.6	Global Climate Thresholds and Tipping Points	112
4.7	Climate, Tipping Points, and Mass Mortality Events	114
4.8	Deforestation Tipping Points	116
4.9	Soils and Crop Production Thresholds	117
	References	118
5	Resources	123
5.1	Natural Resources: Their Historic Exploitation and Exhaustion	124
5.2	Geographic Scale and Resource Consumption	125
5.3	Oil and Coal and Our Carbon-Based Civilization	129
5.4	Societal and Government Responses	130
5.5	Economic Development and Sustainability	133
5.6	Nonrenewable Versus Renewable Energy and Climate Change	137
5.7	Conservation of Natural Landscapes and Ecosystems	139
5.8	US National Park Conservation and Preservation	146
5.9	Ecosystem Services	147
	References	150
6	Population	153
6.1	Contemporary Geographies of Population	154
6.2	A Brief History of Global Population Growth	155
6.3	Perspectives on Population, Resources, and the Environment	161
6.4	Environmental Implications of Population Trends	165
6.5	Chapter Summary	168
	References	168
7	Agriculture	171
7.1	Global Food Systems	174
7.2	Biotechnology in Agriculture	181
7.3	Some of the Most Vulnerable—Smallholder Farmers	183
	References	190
8	Urbanization	193
8.1	Sprawl	195
8.2	Urbanization Versus Nature	196
8.3	Urban Heat Islands	205
8.4	The Built Environment and Weather Hazards	207
8.5	Climate Adaptation in Cities Worldwide	207
8.6	Brownfields	210
	Further Readings	214

9	Practical Solutions	215
9.1	Are There Practical Solutions to the Crises We Face?	216
9.2	Contingency, Resilience, Recovery, and Response	217
9.3	What Can <i>Individuals</i> Do to Mitigate Climate Change, the Sixth Mass Extinction, and Natural Resource Exhaustion?	220
9.4	We Must Support NGOs that Promote Sustainable Food Production and Conserve Natural Resources	229
9.5	What Can <i>Groups</i> Do to Mitigate Climate Change, the Sixth Mass Extinction, and Natural Resource Exhaustion?	230
9.6	Recycling, Energy Usage, and Alternatives	232
9.7	What Can <i>Legislators</i> Do to Mitigate Climate Change, the Sixth Mass Extinction, and Natural Resource Exhaustion?	235
9.8	Looking Back, to Look Forward	236
9.9	Overcoming Looming Global Challenges	237
9.10	Who Is Going to Survive the Crises of Climate Change, Oil Shortages, and Environmental Services Collapse If We Do <i>NOT</i> Adapt or Mitigate?	241
	References	242
	 Supplementary Information	
	Index	247