# Table of Contents

Preface.................................................................................................................................................. xx

Volume I

Section 1
Fundamental Concepts and Theories

This section serves as a foundation for this exhaustive reference tool by addressing underlying principles essential to the understanding of Natural Resources Management. Chapters found within these pages provide an excellent framework in which to position Natural Resources Management within the field of information science and technology. Insight regarding the critical incorporation of global measures into Natural Resources Management is addressed, while crucial stumbling blocks of this field are explored. With 15 chapters comprising this foundational section, the reader can learn and chose from a compendium of expert research on the elemental theories underscoring the Natural Resources Management discipline.

Chapter 1
Global Warming, Climate Policy, and the Green Paradox.................................................................................................................. 1
  Gheorghe H. Popescu, Dimitrie Cantemir Christian University, Romania
  Elvira Nica, Bucharest University of Economic Studies, Romania

Chapter 2
Management of Drought and Floods in Romania............................................................................................... 20
  Lucica Roşu, Constanta Maritime University, Romania
  Remus Zăgan, Constanta Maritime University, Romania

Chapter 3
Climate Change Mitigation: Collective Efforts and Responsibly ............................................................. 64
  Nishi Srivastava, Birla Institute of Technology, India

Chapter 4
The Environmentalism and Politics of Climate Change: A Study of the Process of Global
Convergence through UNFCCC Conferences ........................................................................................................ 77
  Moses Metumara Duruji, Covenant University, Nigeria
  Duruji-Moses Favour Urenma, Covenant University, Nigeria
Chapter 5
Food Security in Asia: Is There Convergence?................................................................. 109
  Sebak K. Jana, Vidyasagar University, India
  Asim K. Karmakar, Jadavpur University, India

Chapter 6
A Fresh Look at Livestock Greenhouse Gas Emissions and Mitigation ......................... 124
  Robert Goodland, World Bank Group, USA

Chapter 7
Protected Agriculture: A Climate Change Adaptation for Food and Nutrition Security .......... 140
  Janet Lawrence, Caribbean Agricultural Research and Development Institute (CARDI),
  Trinidad and Tobago
  Leslie Simpson, Caribbean Agricultural Research and Development Institute (CARDI),
  Jamaica
  Adanna Piggott, Caribbean Agricultural Research and Development Institute (CARDI),
  Trinidad and Tobago

Chapter 8
Review of Climate Change Adaptation and Social Protection Policies of Ghana: The Extent of
Reducing Impacts of Climate Change and Heat Stress Vulnerability of Smallholder Farmers .... 159
  Kwasi Frimpong, Edith Cowan University, Australia
  Eddie Van Etten, Edith Cowan University, Australia
  Jacques Oosthuizen, Edith Cowan University, Australia
  Victor Nufam Fannam, Takporadi Polytechnic, Ghana

Chapter 9
Building Resilience to Climate Change at Local Levels: The Role of Education ................ 174
  Mphemelang Joseph Ketlhoilwe, University of Botswana, Gaborone

Chapter 10
Soil Carbon Sequestration: An Alternative Option for Climate Change Mitigation ............... 188
  Manish Kumar Goyal, Indian Institute of Technology Guwahati, India
  Irom Royal, Indian Institute of Technology Guwahati, India

Chapter 11
Greenhouse Gas Emissions from the Petroleum Industry .................................................. 213
  Lidia Hrnčević, University of Zagreb, Croatia

Chapter 12
Land Classification Research: A Retrospective and Agenda ............................................ 242
  Michael N. DeMers, New Mexico State University, USA

Chapter 13
Engineering Ethics, Global Climate Change, and the Precautionary Principle .................... 254
  Robin Attfield, Cardiff University, UK
Chapter 14
The Call for Global Responsible Inter-Generational Leadership: The Quest of an Integration of Inter-Generational Equity in Corporate Social Responsibility (CSR) Models ........................................ 265
Julia Puaschunder, The New School, USA

Chapter 15
Education, Extension, and Training for Climate Change ................................................................. 279
Isaac Bekele, The University of the West Indies, Trinidad and Tobago
Wayne Ganpat, The University of the West Indies, Trinidad and Tobago

Section 2
Development and Design Methodologies

This section provides in-depth coverage of conceptual architecture frameworks to provide the reader with a comprehensive understanding of the emerging developments within the field of Natural Resources Management. Research fundamentals imperative to the understanding of developmental processes within Natural Resources Management are offered. From broad examinations to specific discussions on methodology, the research found within this section spans the discipline while offering detailed, specific discussions. From basic designs to abstract development, these chapters serve to expand the reaches of development and design technologies within the Natural Resources Management community. This section includes 14 contributions from researchers throughout the world on the topic of Natural Resources Management.

Chapter 16
A Framework for Understanding Adaptation by Manufacturing Industries ........................................ 302
Saon Ray, ICRIER, India

Chapter 17
Green Economy and Sustainable Development ......................................................................................... 314
Elvira Nica, Bucharest University of Economic Studies, Romania

Chapter 18
Adaptation to Climate Change for Sustainable Development: A Survey .......................................... 334
Soumyananda Dinda, Sidho-Kanho-Birsha University, India

Chapter 19
Zanzibari Seaweed: Global Climate Change and the Promise of Adaptation ........................................ 365
Nadra Hashim, Hunger Reduction International, USA

Chapter 20
Nurses, Healthcare, and Environmental Pollution and Solutions: Breaking the Cycle of Harm............ 392
A. Elaine McKeown, Independent Researcher, USA

Chapter 21
Sustainable Business Development by Responding to Climate Change: A Case of the Tata Group ........................................................................................................................................ 416
Sujata Mukherjee, SVKM’s NMIMS, India
Arunavo Mukerjee, Tata Clean Tech Capital Ltd., India
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Optimization of Natural Gas Liquefaction Process</td>
<td>Mohd Sharif Khan, Yeungnam University, South Korea, Moonyong Lee, Yeungnam University, South Korea</td>
<td>432</td>
</tr>
<tr>
<td>23</td>
<td>Flipping the Paradigm of Education: Developing a Comprehensive Educational Program Integrating Virtual Immersive Learning Environments</td>
<td>Donna Russell, Walden University, USA</td>
<td>457</td>
</tr>
<tr>
<td>24</td>
<td>Temporal Data Analysis and Mining Methods for Modelling the Climate Change Effects on Malaysia’s Oil Palm Yield at Different Regional Scales</td>
<td>Subana Shanmuganathan, Auckland University of Technology, New Zealand, Ajit Narayanan, Auckland University of Technology, New Zealand, Nishantha Priyanka Kumara Medagoda, Auckland University of Technology, New Zealand</td>
<td>499</td>
</tr>
<tr>
<td>II</td>
<td>Chapter 25</td>
<td>DG-ABC: An Integrated Multi-Agent and Cellular Automata Urban Growth Model</td>
<td>Elisabete A. Silva, University of Cambridge, UK, Ning Wu, University of Cambridge, UK</td>
</tr>
<tr>
<td>II</td>
<td>Chapter 26</td>
<td>Multi-Scale 3D Geovisualization of Urban Heat Island Data for Planning Dialogue in Toronto</td>
<td>John Danahy, University of Toronto, Canada, Jacob Mitchell, Louisiana State University, USA, Robert Wright, University of Toronto, Canada, Rodney Hoinkes, University of Toronto, Canada, Rob Feick, University of Waterloo, Canada</td>
</tr>
<tr>
<td>II</td>
<td>Chapter 27</td>
<td>The Global Change App: The Creative Transformation of Scientific Research</td>
<td>Stephanie B. Borrelle, Auckland University of Technology, New Zealand, Stanley Frielick, Auckland University of Technology, New Zealand, Roman Asshoff, Westfälische Wilhelms-Universität Münster, Germany, Sebastian Leuzinger, Auckland University of Technology, New Zealand</td>
</tr>
<tr>
<td>II</td>
<td>Chapter 28</td>
<td>Media Literacy as a Pathway to Bridge the Digital and STEM Divides: Interest Driven Media Projects for Teachers in the Trenches</td>
<td>Lesley K. Smith, University of Colorado, USA, Juliette N. Rooney-Varga, University of Massachusetts, USA, Anne U. Gold, University of Colorado, USA, David J. Oonk, University of Colorado, USA, Deb Morrison, Broomfield Heights Middle School, USA</td>
</tr>
</tbody>
</table>
Chapter 29
Nigeria’s Legal Instruments for Land and Water Use: Implications for National Development........ 634
David O. Omole, Tshwane University of Technology, South Africa & Covenant University, Nigeria
Julius M. Ndambuki, Tshwane University of Technology, South Africa

Section 3
Utilization and Applications

This section discusses a variety of applications and opportunities available that can be considered by practitioners in developing viable and effective Natural Resources Management programs and processes. This section includes 14 chapters that review topics from case studies to best practices and ongoing research. Further chapters discuss Natural Resources Management in a variety of settings. Contributions included in this section provide excellent coverage of today’s IT community and how research into Natural Resources Management is impacting the social fabric of our present-day global village.

Chapter 30
Adaptations to Climate Change and Climate Variability in the Agriculture Sector in Mauritius:
Lessons from a Technical Needs Assessment................................................................. 655
Prakash N. K. Deenapanray, Ecological Living in Action Ltd. (ELIA), Mauritius
Indoomatee Ramma, Food and Agricultural Research Council, Mauritius

Chapter 31
Sensitivity Analysis with Calibration of Natural Resource Variables under Climate Change:
Comparing Computable General Equilibrium (CGE) and Econometric Frameworks .............. 681
Nilanjan Ghosh, Observer Research Foundation, India & World Wide Fund for Nature, India
Somnath Hazra, Jadavpur University, India

Chapter 32
Globalization, Governance, and Food Security: The Case of BRICS ........................................ 692
Sebak K. Jana, Vidyasagar University, India
Asim K. Karmakar, Jadavpur University, India

Chapter 33
The Caribbean’s Response to Climate Change Impacts .......................................................... 713
Steve Maximay, Science-Based Initiatives, Trinidad and Tobago

Chapter 34
Soil, Water, and Agricultural Adaptations ........................................................................... 739
Gaius D. Eudoxie, The University of the West Indies, Trinidad and Tobago
Mark Wuddivira, The University of the West Indies, Trinidad and Tobago

Chapter 35
Taking Action from Awareness: Pre-University Student Perspectives, Programs on Climate
Change Issues, and Environmental Education ...................................................................... 758
Carolyn N. Stevenson, SeaTrust Institute/Open College@Kaplan University, USA
Chapter 36
A Comparative Study on World-Wide Carbon Emission Convergence: An Empirical Analysis
Chhanda Mandal, Muralidhar Girls College, India
Anita Chattopadhyay Gupta, Deshandhu College for Girls, India

Chapter 37
Coastal Poverty, Resource-Dependent Livelihood, Climate Change, and Adaptation: An Empirical Study in Indian Coastal Sunderbans
Jyotish Prakash Basu, West Bengal State University, India

Chapter 38
Quantifying Land Cover Change Due to Petroleum Exploration and Production in the Haynesville Shale Region Using Remote Sensing
Daniel Unger, Stephen F. Austin State University, USA
I-Kuai Hung, Stephen F. Austin State University, USA
Kenneth Farrish, Stephen F. Austin State University, USA
Darinda Dans, Stephen F. Austin State University, USA

Chapter 39
On the Use of Different Presentation Formats in an Exhibit at a Science Center to Communicate Sea Level Rise
Subramaniam Ramanathan, Nanyang Technological University, Singapore
Kenneth Feinstein, Nanyang Technological University, Singapore

Chapter 40
Farming Adaptations to the Impacts of Climate Change and Extreme Events in Pacific Island Countries: Case Study of Bellona Atoll, Solomon Islands
Viliamu Iese, The University of the South Pacific, Fiji
Joseph Maeke, The University of the South Pacific, Fiji
Elisabeth Holland, The University of the South Pacific, Fiji
Morgan Wairiu, The University of the South Pacific, Fiji
Sumeet Naidu, The University of the South Pacific, Fiji

Chapter 41
Climate Change Education through Art and Science Collaborations
Phillip Gough, The University of Sydney, Australia
Kate Dunn, The University of NSW, Australia & The University of Sydney, Australia
Caitilin de Bérigny, The University of Sydney, Australia

Chapter 42
Conferences as Learning Spaces on Climate Change and Sustainability: Insights from University Students’ Experiences
Mona Betour El Zoghbi, University of Gloucestershire, UK
Chapter 43
Adaptation to Impacts of Climate Change on the Food and Nutrition Security Status of a Small Island Developing State: The Case of the Republic of Seychelles .................................................. 919
  Antoine Marie Moustache, Ministry of Natural Resources, Republic of Seychelles

Section 4
Organizational and Social Implications

This section includes a wide range of research pertaining to the social and behavioral impact of Natural Resources Management around the world. Chapters introducing this section critically analyze and discuss trends in Natural Resources Management. Also investigating a concern within the field of Natural Resources Management is research which discusses the effect of user behavior on Natural Resources Management. With 13 chapters, the discussions presented in this section offer research into the integration of global Natural Resources Management as well as implementation of ethical and workflow considerations for all organizations.

Chapter 44
Assessing Urban Residents’ Willingness to Pay for Preserving the Biodiversity of Swamp Forest.......................................................... 946
  Huynh Viet Khai, Can Tho University, Vietnam

Chapter 45
Health Impact of Water-Related Diseases in Developing Countries on Account of Climate Change – A Systematic Review: A Study in Regard to South Asian Countries .............................................. 971
  Sukanya Das, TERI University, India

Chapter 46
Research-Based Climate Change Public Education Programs .......................................................... 992
  Mary Beth Hartman, Florida Atlantic University, USA

Chapter 47
Land Deals and Sustainable Income: The Case of a Rural Community in Ogun State, Nigeria...... 1004
  Felicia O. Olokoyo, Covenant University, Nigeria
  Tayo O. George, Covenant University, Nigeria
  Uchenna R. Efobi, Covenant University, Nigeria
  Ibukun Beecroft, Covenant University, Nigeria

Chapter 48
Harmonising CSR and Climate Change Mitigation and Adaptation Strategies to Build Community Adaptive Capacity in Bali’s Tourism Sector.......................................................... 1020
  Putu Indah Rahmawati, Victoria University, Australia
  Terry DeLacy, Victoria University, Australia
  Min Jiang, Victoria University, Australia

Chapter 49
Waterborne Diseases and Climate Change: Impact and Implications .......................................... 1041
  Maha Bouzid, University of East Anglia, UK
Chapter 50
Infectious Diseases and Climate Vulnerability in Morocco: Governance and Adaptation Options

Mohamed Behnassi, Ibn Zohr University of Agadir, Morocco
Kholoud Kahime, Cadi Ayyad University of Marrakesh, Morocco
Samia Boussaa, Higher Institute of Nursing Professions and Health Techniques of Marrakesh, Morocco
Ali Boumezzough, Cadi Ayyad University of Marrakesh, Morocco
Mohammed Messouli, Cadi Ayyad University of Marrakesh, Morocco

Chapter 51
Climate Change Effects on Human Health with a Particular Focus on Vector-Borne Diseases and Malaria in Africa A Case Study from Kano State, Nigeria Investigating Perceptions about Links between Malaria Epidemics, Weather Variables, and Climate Change

Salisu Lawal Halliru, Federal College of Education Kano, Nigeria

Volume III

Chapter 52
Impact of Climate Change on Groundwater Resources

C. P. Kumar, National Institute of Hydrology, India

Chapter 53
Impact of Rapid Urbanization and Climate Change on Agricultural Productivity in Africa: Climate Change Policies in the Agricultural Sector

Mutisya Emmanuel, University of Tokyo, Japan
Lilian Muasa, University of Tokyo, Japan
Chiahsin Chen, University of Tokyo, Japan
Florence Mutisya, London South Bank University, UK
Ram Avtar, United Nations University, Japan

Chapter 54
Gendered Vulnerability and Adaptation to Climate Change

Never Mujere, University of Zimbabwe, Zimbabwe

Chapter 55
Imbalances in the Cadastre and Land Book: Impediment to the Economic Development of Agriculture and Rural Area Overall

Ramona Dobre, Bucharest University of Economic Studies, Romania

Chapter 56
Impacts of Climate Change on Fish Productivity: A Quantitative Measurement

Sibananda Senapati, Chandragupt Institute of Management Patna, India
Vijaya Gupta, National Institute of Industrial Engineering, India
Section 5
Critical Issues and Challenges

This section contains 13 chapters, giving a wide variety of perspectives on Natural Resources Management and its implications. Within the chapters, the reader is presented with an in-depth analysis of the most current and relevant issues within this growing field of study. Crucial questions are addressed and alternatives offered along with theoretical approaches discussed.

Chapter 57
The Dynamics of Food Insecurity in Ethiopia

Melak Mesfin Ayenew, Millennium Institute, Ethiopia & Addis Ababa Science and Technology University, Ethiopia

Chapter 58
U.S. Public Support to Climate Change Initiatives? Setting Stricter Carbon Dioxide Emission Limits on Power Plants

Mary Schmeida, Kent State University, USA
Ramona Sue McNeal, University of Northern Iowa, USA

Chapter 59
Livestock and Climate Change: An Analysis of Media Coverage in the Sydney Morning Herald

Xavier Mayes, Curtin University, Australia

Chapter 60
Energy and Sustainability in the European Region: The Russian Factor

Anatoly Zhuplev, Loyola Marymount University, USA
Dmitry A. Shtykhno, Plekhanov Russian University of Economics, Russia

Chapter 61
Are Climate Change Adaptation Policies a Game Changer? A Case Study of Perspectives from Public Health Officials in Ontario, Canada

Chris G. Buse, University of Northern British Columbia, Canada

Chapter 62
Climate Change-Associated Conflict and Infectious Disease

Devin C. Bowles, Australian National University, Australia

Chapter 63
Exacerbating Health Risks in India due to Climate Change: Rethinking Approach to Health Service Provision

Joyashree Roy, Jadavpur University, India
Duke Ghosh, Global Change Research, India
Kuheli Mukhopadhyay, Jadavpur University, India & West Bengal State University, India
Anupa Ghosh, The Bhawanipur Education Society College, India
Chapter 64
Climate Change and Adaptation through the Lens of Capability Approach: A Case Study from Darjeeling, Eastern Himalaya .............................................................. 1351
   Bhupen Mili, Indian Institute of Technology Guwahati, India
   Anamika Barua, Indian Institute of Technology Guwahati, India
   Suparana Katyaini, Indian Institute of Technology Guwahati, India

Chapter 65
Social Innovation: A Theoretical Approach in Intertwining Climate Change with Social Innovation ................................................................. 1366
   Sayan Banerjee, Chandragupt Institute of Management Patna, India

Chapter 66
Vulnerability to Climate Change: Issues and Challenges towards Developing Vulnerability Indicator .......................................................... 1393
   Sibananda Senapati, Chandragupt Institute of Management Patna (CIMP), India
   Vijaya Gupta, National Institute of Industrial Engineering (NITIE), India

Chapter 67
Lack of Land Tenure Security as Challenges to Sustainable Development: An Assessment in the Context of Bihar, India ................................................ 1417
   Debabrata Samanta, Chandragupt Institute of Management Patna, India

Chapter 68
The Place of Concerns for Posterity in the Global Education for Sustainable Development Agenda: The Case of UNESCO .................................................. 1433
   Katia Vladimirova, LUISS Guido Carli, Italy

Chapter 69
Incremental Learning and Gradual Changes: “Science Field Shops” as an Educational Approach to Coping Better with Climate Change in Agriculture 1454
   Yunita Triwardani Winarto, Universitas Indonesia, Indonesia
   Kees/Cornelis Johan Stigter, Agromet Vision, The Netherlands

Section 6
Emerging Trends

This section highlights research potential within the field of Natural Resources Management while exploring uncharted areas of study for the advancement of the discipline. Introducing this section are chapters that set the stage for future research directions and topical suggestions for continued debate, centering on the new venues and forums for discussion. A pair of chapters on space-time makes up the middle of the section of the final 9 chapters, and the book concludes with a look ahead into the future of the Natural Resources Management field. In all, this text will serve as a vital resource to practitioners and academics interested in the best practices and applications of the burgeoning field of Natural Resources Management.
Chapter 70
How Does Public Attention Influence Natural Gas Price? New Evidence with Google Search
Data .................................................................................................................................................. 1489
Xin Li, University of Chinese Academy of Sciences, China
Jian Ma, City University of Hong Kong, Hong Kong
Wei Shang, Chinese Academy of Sciences, China
Shouyang Wang, University of Chinese Academy of Sciences, China & Chinese Academy of
Sciences, China
Xun Zhang, Chinese Academy of Sciences, China

Chapter 71
Sowing Political Capital and Harvesting Economic Regression: White Commercial Farm Seizures
in Zimbabwe ........................................................................................................................................ 1507
Francis Matambirofa, University of Zimbabwe, Zimbabwe

Chapter 72
Foreign Land Acquisition: Food Security and Food Chains – The Nigerian Experience .......... 1524
Olanrewaju E. Ajiboye, Lagos State University, Nigeria
Olabisi S. Yusuff, Lagos State University, Nigeria

Chapter 73
Science Communication as a Tool for Advancing the Environmental Education on Climate
Change: Can Africa Do It Better? ........................................................................................................ 1546
Innocent Chirisa, University of Zimbabwe, Zimbabwe
Elmond Bandauko, University of Zimbabwe, Zimbabwe
Shingai T. Kawadza, Urban Development Corporation (UDCORP), Zimbabwe

Chapter 74
Learning and Climate Change Adaptation: Moving towards Resilience in an Era of Escalating
Instability ........................................................................................................................................ 1560
Lynn A. Wilson, SeaTrust Institute, USA

Chapter 75
Safety and Efficiency Enhancement in LNG Terminals .................................................................... 1584
Ravinder Singh, Lamar University, USA
Helen Huiru Lou, Lamar University, USA

Chapter 76
Improving the Understanding of Climate Change Factors with Images ..................................... 1597
Geoff Russell, Curtin University, Australia
Chapter 77
Emerging Value Capture Innovative Urban Rail Funding and Financing: A Framework .................... 1617
  Satya Sai Kumar Jillella, Curtin University, Australia
  Sitharam T G, Indian Institute of Science, India
  Anne Matan, Curtin University, Australia
  Peter Newman, Curtin University, Australia

Chapter 78
Beyond Environment, Economy, and Equity: Implementing Power Balancing and Inclusive Process for Integrating our Agreed Framework of Sustainability .................................................. 1633
  Jill Sourial, The Relational Center, USA

Index .................................................................................................................................................. xxiii