Contents

Forewords

Achim Steiner,
Executive Director of the United Nations Environment Programme (UNEP) and
Under-Secretary-General of the United Nations V

Konrad Osterwalder,
Rector, United Nations University and
Under-Secretary-General of the United Nations VII

Jean-François Bureau,
NATO Assistant Secretary General for Public Diplomacy
Chairman, Science for Peace and Security (SPS) Committee IX

Joy Ogwu,
Permanent Representative of the Federal Republic of Nigeria to the United Nations in New York XI

HRH Prince El Hassan bin Talal,
The Hashemite Kingdom of Jordan XIII

Dedications XV

Acknowledgements XXVII

Permissions and Credits XXXI

Prefaces

1

The Anthropocene: Geology by Mankind
Paul Crutzen, Nobel Laureate for Chemistry
Max Planck Institute for Chemistry
Department Atmospheric Chemistry

Connecting Inconvenient Truths: Urgency of Nuclear Disarmament in a World of Pressing Problems
Amb. Jayantha Dhanapala,
Former UN Under-Secretary General for Disarmament,
President, Pugwash Conferences on Science and World Affairs

Living in and Coping with World Risk Society
Ulrich Beck

Population Prospects and the Challenges of Sustainability
Hania Zlotnik

Towards a Great Land-Use Transformation?
Christoph Müller, Hermann Lotze-Campen, Veronika Huber,
Alexander Popp, Anastasia Svirejeva-Hopkins, Michael Krause and
Hans Joachim Schellnhuber

XXVII

XXXI

3

5

11

17

23
## Contents

### Part I Introduction: Concepts of Security Threats, Challenges, Vulnerabilities and Risks

1. Introduction: Coping with Global Environmental Change in the Anthropocene
   *Hans Günter Brauch and Ursula Oswald Spring*

2. Concepts of Security Threats, Challenges, Vulnerabilities and Risks
   *Hans Günter Brauch*

3. Disaster Risk and Vulnerability: Concepts and Measurement of Human and Environmental Insecurity
   *Omar D. Cardona*

4. Economic Vulnerability and Economic Security
   *Czeslaw Mesjasz*

5. Debt Relief, Economic Growth and Poverty Reduction in Low-Income Countries
   *Lidia Mesjasz*

### Part II Securitization of Global Environmental Change

   *Alyson J.K. Bailes*

7. NATO’s Traditional Security Problems
   *Pál Dunay*

   *Eduard Soler i Lecha*

   *Mustafa Aydin and Asli Toksabay Esen*

10. Promoting Democracy as a Security Goal. The ‘inward-outward’ Paradox of the EU’s Foreign Policy
    *Omar Serrano*

11. Language Games on Security in Finland: Towards Changing Concepts of the State and National Survival
    *Vilho Harle and Sami Moisio*

    *Hans Günter Brauch*

    *Alexander Sergunin*

14. Russian Security Policy in the 21st Century Based on the Experiences of its First Decade
    *Pál Dunay*
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Non-Traditional Security and the New Concept of Security of China</td>
<td>Zhongqin Zhao</td>
<td>307</td>
</tr>
<tr>
<td>16</td>
<td>Perceptions of Hard Security Issues in the Arab World</td>
<td>Gamal M. Selim</td>
<td>313</td>
</tr>
<tr>
<td>17</td>
<td>Arab Perceptions of Soft Security Issues</td>
<td>Mohammad El-Sayed Selim</td>
<td>327</td>
</tr>
<tr>
<td>18</td>
<td>Military Challenges and Threats in West Africa</td>
<td>Kwesi Aning and Andrews Atta-Asamoah</td>
<td>339</td>
</tr>
<tr>
<td>19</td>
<td>Weak States and Security Threats in West Africa</td>
<td>John Emeka Akude</td>
<td>353</td>
</tr>
<tr>
<td></td>
<td><strong>Part III</strong> Economic, Social, Environmental Security and Human Threats, Challenges, Vulnerabilities and Risks in the Near East, North and Sub-Sahara Africa and in Asia</td>
<td></td>
<td>369</td>
</tr>
<tr>
<td>20</td>
<td>Environmental Challenges and Risks in North Africa</td>
<td>Béchir Chourou</td>
<td>371</td>
</tr>
<tr>
<td>21</td>
<td>Water Degradation as a Human Security Challenge in Jordan</td>
<td>Bassam Ossama Hayek and Nisreen Daifallah Al Hmoud</td>
<td>395</td>
</tr>
<tr>
<td>22</td>
<td>Water Scarcity and Degradation in Palestine as Challenges, Vulnerabilities, and Risks for Environmental Security</td>
<td>Marwan Haddad</td>
<td>409</td>
</tr>
<tr>
<td>23</td>
<td>Social, Environmental and Security Impacts of Climate Change on the Eastern Mediterranean</td>
<td>Hilmi S. Salem</td>
<td>421</td>
</tr>
<tr>
<td>24</td>
<td>Progressive Development of the Water Resources of Israel and Palestine to Mitigate the Negative Impact of Global Warming</td>
<td>Arie S. Issar</td>
<td>447</td>
</tr>
<tr>
<td>25</td>
<td>Jerusalem: Where To? In Search for Hidden Opportunities</td>
<td>Mohammed S. Dajani Daoudi and Ashraf M. Dajani</td>
<td>459</td>
</tr>
<tr>
<td>26</td>
<td>Global Climate Change Impacts for the Mediterranean in the 21st Century: Challenges for Human and Environmental Security</td>
<td>Hans Günter Brauch</td>
<td>485</td>
</tr>
<tr>
<td>27</td>
<td>Global Environmental Change and Conflict Potential in Central Asia</td>
<td>Jennifer Sehring and Ernst Giese</td>
<td>525</td>
</tr>
<tr>
<td>28</td>
<td>Impact of Environmental Change on Stability and Conflict Potentials in China</td>
<td>Thomas Heberer and Anja D. Senz</td>
<td>535</td>
</tr>
</tbody>
</table>
### Part IV Threats, Challenges, Vulnerabilities and Risks for Urban Centres in Hazards and Disasters

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>The Vulnerability of Cities to Disasters and Climate Change: A Conceptual Framework</td>
<td>547</td>
</tr>
<tr>
<td></td>
<td>Mark Pelling</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Vulnerability to Natural Hazards: Case Study on Landslide Risks in La Paz</td>
<td>549</td>
</tr>
<tr>
<td></td>
<td>Fabien Nathan</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Revealing the Impact of Small Disasters to the Economic and Social Development</td>
<td>559</td>
</tr>
<tr>
<td></td>
<td>Mabel C. Marulanda, Omar D. Cardona and Alex H. Barbat</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Climate Change, Natural Hazards and Coastal Ecosystems in Latin-America: A Framework for Analysis</td>
<td>575</td>
</tr>
<tr>
<td></td>
<td>Carmen Lacambra and Kaveh Zahedi</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Flood Loss Redistribution in a Third World Megacity: The Case of Mumbai</td>
<td>585</td>
</tr>
<tr>
<td></td>
<td>Monalisa Chatterjee</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Coping with Water- and Wastewater-related Risks in Megacity Delhi</td>
<td>603</td>
</tr>
<tr>
<td></td>
<td>Reena Singh</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Politics of Displacement and Vulnerability</td>
<td>613</td>
</tr>
<tr>
<td></td>
<td>Nanda Kishor</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Linking Oriental and Western Thinking to Mitigate Flood Risk</td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>Xiaomeng Shen</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Preparation for an Earthquake in the Megacity Istanbul</td>
<td>637</td>
</tr>
<tr>
<td></td>
<td>Sıdika Tekeli Yeşil</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Risk Management Strategies for the Predicted Earthquake Hazard in Istanbul</td>
<td>647</td>
</tr>
<tr>
<td></td>
<td>Ebru A. Gencer</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Urban Vulnerability to Climate Change and Natural Hazards in Nigeria</td>
<td>655</td>
</tr>
<tr>
<td></td>
<td>Adeniyi Sulaiman Gbadegesin, Felix Bayode Olorunfemi and Usman Adebimpe Raheem</td>
<td>669</td>
</tr>
</tbody>
</table>

### Part V Coping with Global Environmental Change: Climate Change, Soil and Desertification, Water Management, Food and Health

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>Quantifying Global Environmental Change Impacts: Methods, Criteria and Definitions for Compiling Data on Hydro-meteorological Disasters</td>
<td>689</td>
</tr>
<tr>
<td></td>
<td>Debarati Guha-Sapir and Femke Vos</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Stormy Weather: International Security in the Shadow of Climate Change</td>
<td>693</td>
</tr>
<tr>
<td></td>
<td>Steffen Bauer</td>
<td></td>
</tr>
</tbody>
</table>

### Section A: Climate Change

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>Stormy Weather: International Security in the Shadow of Climate Change</td>
<td>719</td>
</tr>
<tr>
<td></td>
<td>Steffen Bauer</td>
<td></td>
</tr>
</tbody>
</table>
42 Security Risks of Climate Change: Vulnerabilities, Threats, Conflicts and Strategies
Jürgen Scheffran
735

43 New Threats? Risk and Securitization Theory on Climate Change and Water
Anders Jägerskog
757

44 Dealing With Uncertainties in Climate Change Impacts Assessments: A Case Study on the Nile Basin
Carlo Buontempo, Jens Kristian Lørup, Michael Sanderson, Michael Butts, Erika Palin, Rachel McCarthy, Richard Jones, Richard Betts and Mamdouh Antar
765

45 Mapping Areas Affected by Sea-Level Rise due to Climate Change in the Nile Delta Until 2100
Mohamed El Raey
773

46 Vulnerability of Tropical Montane Rain Forest Ecosystems due to Climate Change
Hans Juergen Boehmer
789

Section B: Soil and Desertification

47 Securitizing Land Degradation and Desertification: A Proactive Soil Security Concept
Hans Günter Brauch and Ursula Oswald Spring
803

48 Alternative Livelihoods for Attaining Sustainability and Security in Drylands
Uriel N. Safriel
835

49 Societal Vulnerability to Desertification and Policy Response Options
Zafar Adeel
853

50 Desertification Process in Egypt
Ismail Abd El Galil Hussein
863

51 Impacts of Drought on Agriculture in Northern Mexico
Tulio Arredondo Moreno and Elisabeth Huber-Sannwald
875

52 Traditional Knowledge in Coping with Desertification
Pietro Laureano
893

53 Prodromes of Desertification in the Oasis of Tafilalet (Morocco) and Specific Local Solutions
Monique Mainguet, Frédéric Dumay, Lahcen Kabiri and Boualem Rémini
901

54 Agriculture in Drylands: Experience in Almeria
Andrés Miguel García Lorca
921

55 Land-use Changes, Desertification, and Climate Change Impacts in South-eastern Spain
Jorge García Gómez, Francisco López-Bermúdez and Juan Manuel Quiñonero Rubio
935
Section C: Water Management

56 Reconsidering Integrated Water Resources Management: Promoting Economic Growth and Tackling Environmental Stress
Jakob Granit

57 Coping with Population Growth, Climate Change, Water Scarcity and Growing Food Demand in China in the 21st Century
Zhanyi Gao and Yaqiong Hu

58 Ensuring Water Security in Rural Areas of Bangladesh under Climate Change and Non-climatic Drivers of Change
Mohammed Rahman Zillur and Kuntala Lahiri-Dutt

59 Applying Bottom-up Participatory Strategies and Traditional Methods of Water Harvesting in the Thar Desert, Rajasthan
Kanupriya Harish and Mathews Mullackal

60 Coping with Water Scarcity in the Sahel: Assessing Groundwater Resources in the Western Sahel
Abdelkader Dodo, Mohamedou Ould Baba Sy and Jihed Channem

Section D: Coping with Food Security Issues

61 Global Threats, Global Changes and Connected Communities in the Global Agrofood System
John Grin and Esther Marijnen

62 Genetically Modified Organisms: A Threat for Food Security and Risk for Food Sovereignty and Survival
Úrsula Oswald Spring

63 Natural Disasters and Major Challenges towards Achieving Food Security in the Sahel: The Experience of CILSS
Issa Martin Bikienga

64 Responding to Climate Variability and Change: Opportunities and Challenges for Governance
Sreeja Nair

65 Coping with Climate Change Impacts on Coffee and Maize for Peasants in Mexico
Cecilia Conde

Section E: Coping with Health Security Issues

66 The Impact of AIDS on Women’s Social Life in a Mexican Rural Community
Fátima Flores and Wolfgang Wagner

67 Integrated Assessment of Vulnerability to Heat Stress in Urban Areas
Tanja Wolf, Glenn McGregor and Anna Paldy
### Part VI Coping with Hazards and Strategies for Coping with Social Vulnerability and Resilience Building

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>Regulation and Coupling of Society and Nature in the Context of Natural Hazards</td>
<td>1103</td>
</tr>
<tr>
<td>Jörn Birkmann</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Differentials in Impacts and Recovery in the Aftermath of the 2004 Indian Ocean Tsunami: Local Examples at Different Scales in Sri Lanka</td>
<td>1129</td>
</tr>
<tr>
<td>Katharina Marre and Fabrice Renaud</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Risks in Central America: Bringing Them Under Control</td>
<td>1147</td>
</tr>
<tr>
<td>Juan Carlos Villagrán de León</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Economics and Social Vulnerability: Dynamics of Entitlement and Access</td>
<td>1159</td>
</tr>
<tr>
<td>Koko Warner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Social Vulnerability, Discrimination, and Resilience-building in Disaster Risk Reduction</td>
<td>1169</td>
</tr>
<tr>
<td>Úrsula Oswald Spring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Part VII Coping with Global Environmental Change: Scientific, International, Regional and National Political Strategies, Policies and Measures

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>Coping with Global Environmental Change: Need for an Interdisciplinary and Integrated Approach</td>
<td>1193</td>
</tr>
<tr>
<td>G.A. McBean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Research Agenda and Policy Input of the Earth System Science Partnership for Coping with Global Environmental Change</td>
<td>1205</td>
</tr>
<tr>
<td>Rik Leemans, Martin Rice, Ann Henderson-Sellers and Kevin Noone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>The International Human Dimensions Programme on Global Environmental Change – Taking Stock and Moving Forward</td>
<td>1221</td>
</tr>
<tr>
<td>Louise von Falkenhayn, Andreas Reckemmer and Oran R. Young</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>DIVERSITAS: Biodiversity Science Integrating Research and Policy for Human Well-Being</td>
<td>1235</td>
</tr>
<tr>
<td>Bruno A. Walther, Anne Larigauderie and Michel Loreau</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>The International Geosphere-Biosphere Programme’s (IGBP) Scientific Research Agenda for Coping with Global Environmental Change</td>
<td>1249</td>
</tr>
<tr>
<td>Kevin J. Noone, Carlos Nobre and Sybil Seitzinger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Climate Information for Coping with Environmental Change: Contributions of the World Climate Research Programme</td>
<td>1257</td>
</tr>
<tr>
<td>John A. Church, Chassem R. Asrar, Antonio J. Busalacchi and Carolin E. Arndt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section B: Global Strategies, Policies and Measures for Coping with Climate Change

79  Key IPCC Conclusions on Climate Change Impacts and Adaptations
    Martin Parry, Osvaldo Canziani, Jean Palutikof and Clair Hanson

80  Options for Mitigating Climate Change Results of Working
    Group III of the Fourth Assessment Report of the IPCC
    Peter Bosch and Bert Metz

81  Global Climate Change, Natural Hazards, and the Environment:
    an Overview of UNESCO’s Activities
    Walter Erdelen and Badaoui Rouhban

82  Climate Change and Development: UNDP’s Approach to Helping
    Countries Build a New Paradigm
    Veerle Vandeweerd, Yannick Clémarec and Vivienne Caballero

Section C: Regional Strategies, Policies and Measures for Coping with Climate Change

83  EU Strategies for Climate Change Policy Beyond 2012
    Christian Egenhofer, Arno Behrens and Anton Georgiev

84  Coping with Climate Change in East Asia: Vulnerabilities and
    Responsibilities
    Paul G. Harris

85  Strategies for Coping with Climate Change in Latin America: Perspective
    beyond 2012
    Ricardo Zapata-Martí

86  Politics of Equity and Justice in Climate Change Negotiations in
    North-South Relations
    Ariel Macaspac Penetrante

Section D: National Strategies, Policies and Measures for Coping with Climate Change

87  Climate Change: Long-Term Security Implications for China and the
    International Community
    Yu Hongyuan and Paul J. Smith

88  Japanese Climate Change Policy: Moving Beyond the Kyoto Process
    Hiroshi Ohta

89  Implications of Equity Considerations and Emission Reduction Targets:
    Lessons from the Case of Japan’s Mid-Term Target
    Norichika Kanie, Hiromi Nishimoto, Yasuaki Hijioka and
    Yasuko Kameyama
Part VIII  A Technical Tool: Remote Sensing, Vulnerability Mapping and Indicators of Environmental Security Challenges and Risks  1401
90  Land-use and Flood Risk Changes in Coastal Areas of South-eastern Spain  1403
Juan M. Quiñonero-Rubio, Francisco López-Bermúdez, Francisco Alonso-Sarría and Francisco J. Gomariz-Castillo
91  Monitoring Conflict Risk: The Contribution of Globally Used Indicator Systems  1415
Jochen Jesinghaus

Part IX  Towards an Improved Early Warning of Conflicts and Hazards  1427
92  Networking Disaster and Conflict Early Warning in Response to Climate Change  1429
Patrick Meier
93  Vulnerability Assessment in Sri Lanka in the Context of Tsunami Early Warning  1441
Juan Carlos Villagrán de León

Part X  Summary and Conclusions  1451
94  Political Geoecology for the Anthropocene  1453
Hans Günter Brauch, Simon Dalby and Ursula Oswald Spring
95  Coping with Global Environmental Change – Sustainability Revolution and Sustainable Peace  1487
Ursula Oswald Spring and Hans Günter Brauch

Abbreviations  1505
Bibliography  1521
Biographies of Contributors  1711
Index  1765
Coping with Global Environmental Change, Disasters and Security
Threats, Challenges, Vulnerabilities and Risks
Brauch, H.G.; Oswald Spring, Ú.; Mesjasz, C.; Grin, J.;
Kameri-Mbote, P.; Chourou, B.; Dunay, P.; Birkmann, J.
(Eds.)
2011, CII, 1818 p. In 2 volumes, not available separately., Hardcover
ISBN: 978-3-642-17775-0