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Climate change and agriculture

Edited by Dr Delphine Deryng, NewClimate Institute/Integrative Research Institute on Transformations of Human-Environment Systems (IRI THESys), Humboldt-Universität zu Berlin, Germany



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About the book

Climate change is the biggest challenge agriculture faces. Part 1 of this collection reviews current research on the impacts of climate change on agriculture. Part 2 assesses what we know about the contribution of agriculture to climate change, whilst Part 3 surveys mitigation strategies to achieve a more 'climate-smart' agriculture.

About the editor

Dr Delphine Deryng is a Climate Policy Analyst at the NewClimate Institute based in Berlin, Germany since May 2020, focusing primarily on global climate actions in the agriculture and forestry sector. Dr Deryng is also a Guest Researcher at the Integrative Research Institute on Transformations of Human-Environment Systems (IRI THESys) at Humboldt-Universität zu Berlin.

Climate change and agriculture

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Climate change and agriculture

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Part 1 The impacts of climate change on agriculture

1. The effects on crop cultivation of increased CO₂, temperature and ozone levels due to climate change: *Eline Vanuytrecht, Flemish Institute for Technological Research (VITO) and KU Leuven Department of Earth & Environmental Sciences, Belgium*
2. Effects of climate change on agricultural soils: *Kennedy Were, Kenya Agricultural and Livestock Research Organisation, Kenya; and Bal Ram Singh, Norwegian University of Life Sciences, Norway*
3. Modeling the effects of climate change on agriculture: a focus on cropping systems: *M. Adam, CIRAD, Burkina Faso; K. J. Boote, University of Florida–Gainesville, USA; G. N. Falconnier, CIRAD, France; C. H. Porter, University of Florida–Gainesville, USA; E. Eyshi Rezaei, University of Göttingen, Germany; and H. Webber, University of Bonn and Leibniz Centre for Agricultural Research (ZALF), Germany*

Part 2 The contribution of agriculture to climate change

4. Quantifying the role of livestock in climate change: *Julie Wolf, USDA-ARS, USA*
5. The role of crop cultivation in contributing to climate change: *Sonali Shukla McDermid and David Kanter, New York University, USA*
6. The role of agricultural expansion, land cover and land-use change in contributing to climate change: *Catherine E. Scott, University of Leeds, UK*
7. Measuring and quantifying greenhouse gas emissions from agricultural activities: *Mohammad Ibrahim Khalil, University College Dublin & Prudence College Dublin/GSustain, Ireland; Syed Faiz-ul Islam, University College Dublin, Ireland; Macdara O'Neill, University College Dublin & Teagasc, Ireland; and Bruce Osborne, University College Dublin, Ireland*

Part 3 Adaption and mitigation strategies in agriculture

8. Climate-smart crop production: understanding complexity for achieving triple-wins: *Katrien Descheemaeker, Pytrik Reidsma and Ken E. Giller, Plant Production Systems, Wageningen University & Research, The Netherlands*
9. The contribution of integrated crop–livestock systems in combatting climate change and improving resilience in agricultural production to achieve food security: *Mark van Wijk and James Hammond, International Livestock Research Institute, Kenya; Simon Fraval, International Livestock Research Institute, Kenya and Wageningen University, The Netherlands; Jannike Wichern, Wageningen University, The Netherlands; Randall Ritzema, Olivet Nazarene University, USA; and Ben Henderson, Natural Resources Policy, Organisation for Economic Co-operation and Development (OECD), France*
10. Agroforestry as a solution for multiple climate change challenges in Africa: *C. Mbow, Future Africa at University of Pretoria, South Africa and Michigan State University, USA; E. Toensmeier, Perennial Agriculture Institute, USA; M. Brandt, University of Copenhagen, Denmark; D. Skole, Michigan State University, USA; M. Dieng, Senegalese Institute of Agricultural Research (ISRA), Senegal; D. Garrity, World Agroforestry Centre, Kenya; and B. Poulter, NASA Goddard Space Flight Center, USA*

“The challenges ahead for agriculture globally are substantial and growing: feeding an increasingly populous and hungrier world whilst managing increased risks from climate change, reducing greenhouse gas emissions and operating in ways that enhance ecosystem services. The highly experienced editor and authors of this book bring together a comprehensive coverage of these issues and their potential resolution.”

Prof. Mark Howden, Director - Climate Change Institute, Australian National University; Vice Chair - IPCC Working Group II