Contents

List of contributors vii
Acknowledgments xvi

1 Introduction 1
Ariel Dinar and Robert Mendelsohn

PART I   AGRONOMIC STUDIES OF CLIMATE IMPACTS AND ADAPTATION

2 Climate change, carbon dioxide and global crop production: food security and uncertainty 9
Lewis H. Ziska

3 Effects of climate variability on domestic livestock 32
Terry L. Mader and John B. Gaughan

4 From the farmer to global food production: use of crop models for climate change impact assessment 49
Ana Iglesias, Jeremy Schlickenrieder, David Pereira and Agustín Diz

5 Investigating the connections between climate change, drought and agricultural production 73
Michael Hayes, Donald A. Wilhite, Mark Svoboda and Miroslav Trnka

PART II   ECONOMIC STUDIES OF CLIMATE IMPACTS ON AGRICULTURE

6 Farm-level impacts of climate change: alternative approaches for modeling uncertainty 89
Dannele E. Peck and Richard M. Adams

7 Using panel data models to estimate the economic impacts of climate change on agriculture 112
Olivier Deschenes and Michael Greenstone

8 The impact of climate change on US agriculture: a repeated cross-sectional Ricardian analysis 141
Emanuele Massetti and Robert Mendelsohn

PART III AGRICULTURAL IMPACTS ON THE ECONOMY

9 Economy-wide impacts of climate change on agriculture – case study for adaptation strategies in sub-Saharan Africa 169
Alvaro Calzadilla, Tingju Zhu, Katrin Rehdanz, Richard S.J. Tol and Claudia Ringler
Contents

10 Integrated assessment models – the interplay of climate change, agriculture and land use in a policy tool 204
Marian Leimbach, Alexander Popp, Hermann Lotze-Campen, Nico Bauer, Jan Philipp Dietrich and David Klein

11 The role of growth and trade in agricultural adaptation to environmental change 230
John Reilly

PART IV AGRICULTURAL MITIGATION

12 Biofuels and climate change 271
Gal Hochman, Deepak Rajagopal and David Zilberman

13 The present and future role for agricultural projects under the Clean Development Mechanism 292
Donald F. Larson, Ariel Dinar and J. Aapris Frisbie

PART V ADAPTATION TO AGRICULTURAL IMPACTS

14 Agricultural adaptation: needs, findings and effects 327
Ruth A. Aisabokhae, Bruce A. McCarl and Yuquan W. Zhang

15 Hydro-economic modeling to assess climate impact and adaptation for agriculture in California 342
Josué Medellín-Azuara, Richard E. Howitt and Jay R. Lund

16 Reducing the impact of global climate change on agriculture – the use of endogenous irrigation and protected agriculture technology 355
Aliza Fleischer and Pradeep Karukulasuriya

17 Climate change and technological innovation in agriculture: adaptation through science 382
Douglas Gollin

18 Adaptation to climate change in mixed crop–livestock farming systems in developing countries 402
Philip K. Thornton, Mario Herrero and Peter G. Jones

19 Insurance as an adaptation to climate variability in agriculture 420
Alberto Garrido, Maria Bielza, Dolores Rey, M. Inés Mínguez and M. Ruiz-Ramos

20 An analysis of the choice of livestock species under global warming in African and Latin American farms 446
S. Niggol Seo

21 Climate change, drought and agriculture: the role of effective institutions and infrastructure 466
R. Maria Saleth, Ariel Dinar and J. Aapris Frisbie

22 Conclusion and future research 486
Robert Mendelsohn and Ariel Dinar

Index 499